LOSS AVERSION AND MANAGERIAL DECISIONS: EVIDENCE FROM MAJOR LEAGUE BASEBALL*

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Abstract

Previous research indicates that management changes are important events for organizations, partly because they lead to reversals of poor prior decisions. However, an unanswered question is why replacing the manager seems to be necessary for reversing poor decisions. One explanation is that managers are averse to admitting mistakes (loss aversion). We test this hypothesis with a research design that mitigates many of the measurement problems associated with investment decisions in traditional corporate settings. Our sample consists of 15,880 player-team-year observations for Major League Baseball players. We study the annual decisions to retain or divest players and find that new general managers, compared to continuing managers, are more likely to divest players and, especially low-performing players. The pattern of decisions suggests that the acquiring manager's aversion to loss recognition creates a need for new managers to reverse the mistakes of their immediate predecessors. The findings suggest that loss aversion plays a significant role in managerial decisions and in managerial turnover.

1 INTRODUCTION AND MOTIVATION

Previous research indicates that management changes are important events for organizations, partly because they lead to reversals of poor prior decisions.[1] However, this research begs the question of why it may be necessary to implement a managerial change in order to reverse prior bad decisions. Why is a manager who makes the poor decision not likely to reverse it? The issue of how and why managers react to their own poor investment decisions is a difficult one to study empirically for a number of reasons. The important decisions (e.g., mergers and acquisitions) are not necessarily of the same type across industries, or even within an industry, and empirical analysis of disparate decisions is not straightforward. Moreover, the results of decisions may not be observable. When public firms announce acquisitions, for example, subsequent performance of the investment is not generally distinguishable from overall firm performance. Typically, the success of projects is evaluated prospectively using event study methods that document investor reactions to announcements or by using indirect approaches. Lehn and Mitchell (1990), for example, study whether bad bidders make good targets in the takeover market.

In this paper, we provide a different approach to analyzing managerial decisions regarding the acquiring and divesting of key assets. Our objective is to utilize an empirical design that holds the industry and competitive conditions constant and that allows us to study numerous observations of managers making acquisition/divestiture decisions. We also want the ability to observe the performance of acquired assets and how managers react to the performance once it is revealed. To satisfy these criteria, we analyze outcomes in Major League Baseball (MLB). Using player and manager turnover data for three

[1] See Lehn and Mitchell (l990) and Weisbach (1995) as examples.

decades, we observe annual decisions to invest or divest "assets" (players). We identify the manager who made the acquisition decision and can measure the absolute and relative performance of individual players. We also observe retention choices of new managers who did not acquire the player. Hence, we can evaluate how the acquiring manager's behavior differs from managers who inherit poor performing players. The advantage is that we can test whether the acquiring manager has an aversion for admitting mistakes relative to other managers who were not involved with the initial acquisition.

Regarding key personnel, managers in most industries possess hidden information about work ethic, productivity, collegiality, conflicts with team members, potential impairments, etc. This makes it difficult to evaluate whether a manager made a mistake because outsiders (owners, analysts, etc.) do not actually observe relative productivity measures. In professional baseball, we do not face this limitation because much of this otherwise unobservable information is public. Objective measures of absolute and relative performance, like batting success and fielding ability, are inexpensive to generate and to provide to all interested parties. Hence, in contrast to more general labor market and business settings, observable performance measures are less noisy indicators of individual productivity. While some relative performance measures are available from corporations on specific projects, in contrast to baseball statistics, they are not as transparent, verifiable, or as frequently updated.

The general proposition we investigate is that managers exhibit a behavioral bias of loss aversion. They "hang on" to poorly performing assets or employees ("losers") they were instrumental in acquiring or hiring. As Aronson, et al. (2010) point out, avoiding admission of mistakes is a common human trait. Once we have committed time or energy

to a cause, it seems to be nearly impossible to convince us that the cause is unworthy. Psychological aversion to admitting mistakes is related to loss aversion and reflects a cognitive bias. It contrasts with agency cost explanations for why managers may not behave as the owners would like.

Agency costs arise when an agent (e.g., a manager) acts rationally in his own interest, but not in the interest of the principal (e.g., the firm owner). Agency costs could include efforts to hide hiring mistakes, or perhaps hiring individuals whom the manager likes but who do not add value to the organization compared to alternatives. In the presence of asymmetric information, managers have an incentive to disguise or conceal those decisions to avoid negative consequences (e.g., reduced marketability as a manager, demotion, firing, etc.). Loss aversion, in contrast, relates to a cognitive bias where the manager fails to see the problem or discounts negative experience as non-representative. This is a psychological reaction in an attempt to minimize cognitive dissonance, so it may be present even in scenarios that are not characterized by moral hazard or other forms of imperfect information.

Using three decades of data on manager and player turnover in MLB, we: (1) estimate the tendency of incumbent managers to hold on to low-performing players rather than divest them; (2) test the hypothesis that new managers unwind the mistakes of previous managers; and (3) distinguish between an agency cost explanation for player retention and a cognitive bias explanation. Since we can identify the manager who hired the player, we can test for bias in retention choices and can observe how a new manager responds to players his predecessor hired, as opposed to players hired by even earlier managers.

Since retention decisions can be influenced by variation in player talent and team success, we estimate probability models that simultaneously control for the relevant player and team performance characteristics. Holding these factors constant, we proceed in steps to consider, and possibly rule out, the following motivations for divesting players: (1) Players may be divested due to efforts by managers to rid their rosters of players with low performance statistics and replace them with players who have exhibited better performance. We refer to this motivation as "window dressing/career concerns," as decisions to divest may reflect concerns that retaining low-performing players would harm their reputations as managers. (2) Players may be divested because, when a new manager arrives, he initiates a "new strategic direction," which implies more player turnover, and not necessarily turnover directed only at low performers. An alternative way of stating this is that new managers examine the roster of players they inherit and look for the best quality matches in terms of how their style and skills mesh with the individual player's skill set. The quality of a match may be unrelated to past player performance, as the new manager may be able to increase productivity of lower-performing players, whereas the previous manager could not. (3) Players may be divested because, when a new manager arrives, he reverses decisions of previous managers who tend to hang on to the poor performing players they hired.

The empirical results for the full sample of players show that poor-performing players are more likely to be divested, other things the same, and that this is especially true for poor-performing players on teams with new managers. It appears that the impetus for divestiture generally is a managerial change. When we focus on the subset of players on teams with new managers, so that all players were hired by previous managers, our

findings are most consistent with loss aversion. While we do observe that new managers are more likely to terminate low performers, and therefore could reflect, for example, new strategic direction or window dressing, there is no reason to expect that the choice to divest would vary systematically with the identity of the manager who hired the poor-performing players. Instead, we can trace the reluctance to get rid of losers to the immediate preceding general manager who hired the player. When a new general manager comes on board and is confronted with a low-performer who was acquired by the immediate preceding manager, the new manager is significantly more likely to replace the player than if the player were acquired by an even earlier manager.

2 BACKGROUND LITERATURE

Two basic explanations are offered in the literature as to why managers, as agents, might be resistant to recognizing losses and divesting underperforming assets—one is behavioral and suggests a cognitive bias, and the other is an agency cost based on the rational utility-maximizing efforts of the manager. Both cognitive bias and agency cost can lead to suboptimal decisions from the principal's perspective. We refer to the first as loss aversion and the second as agency costs.

Loss aversion, a concept developed from prospect theory, refers to the tendency for people to fail to perceive their mistakes.[2] Loss aversion has been offered as an explanation for the sunk cost fallacy and for the endowment effect (that people place higher values on a

[2] Loss aversion was convincingly demonstrated by Tversky and Kahneman (1979, 1991).

good that they own than an identical good that they do not own).[3] Evidence from multiple settings shows that people subjectively reinforce decisions or commitments they have already made. In one simple experiment, for example, Knox and Inkster (1968) found that bettors at a horse track believed bets were more likely to succeed immediately after being placed. According to the theory, the possibility of being wrong is dissonance-arousing, so people will change their perceptions to make their decisions seem better.

A behavioral explanation for hanging on to poorly performing assets is offered in Li and Scherbina's (2007) study of stock selections by mutual fund managers. They examine the buying and selling decisions of continuing and new fund managers. Compared with continuing fund managers, new managers tend to sell loser stocks at a faster rate than winners. They conjecture that continuing managers fail to ignore the "sunk costs" associated with the stocks' past underperformance. While the authors raise the possibility of cognitive bias, they do not provide a test to distinguish that explanation from agency cost.

The agency cost explanation argues that a manager's failure to rid an organization of inefficiencies he or she created arises because a discovery of the inefficiencies (or errors in judgment) can have negative consequences for the manager's current job and subsequent marketability. Efforts to manage earnings may fall into the agency cost category if earnings management is undertaken to hide mistakes. Also, a corporate manager may have ulterior private motives for acquisitions, such as "empire building," which may be accompanied with higher pay and enhanced reputation associated with managing larger organizations.

[3] See Kahneman, Knetsch, and Thaler (1990). They point out that loss aversion and the endowment effect lead to a violation of the Coase theorem; i.e., that "the allocation of resources will be independent of the assignment of property rights when costless trades are possible" (p. 1326).

Several well known studies are consistent with the agency cost interpretation of holding-on-to-losers. Boot (1992) studies corporate divestitures and the question of why firms delay selling underperforming divisions. He suggests a version of agency cost, and points out that asymmetric information allows managers who recognize their ex post mistakes to hide their prior bad investment choices from investors. Cho and Cohen (1997) suggest that holding-on-to-losers allows managers to "blur" their poor performance under cover of the remaining operating units. Firms tend not to sell off poorly-performing business units, unless the firm experiences significant underperformance relative to industry peers.

Many of these studies also relate their findings to managerial turnover. Kanodia, Bushman, and Dickhaut (1989) argue that managers are reluctant to give up on projects because doing so would convey a negative signal to the market about the manager's ability. The replacement manager, however, does not care about the first manager's reputation. Hence, managerial changes will coincide with divestiture of unprofitable assets. Similarly, if a new manager's compensation or labor market reputation is related to improved performance, then new managers may want to realize losses and decrease earnings immediately upon succession. This incentive, related to the "big bath hypothesis" in accounting, suggests that sales of unprofitable assets will quickly follow management changes.[4]

Lehn and Mitchell (1990) illustrate how markets work to reverse prior bad choices or prevent new ones. Specifically, they study a motive for corporate takeovers—i.e., to change control of firms that make acquisitions that diminish the value of their equity. They

[4] See Elliot and Shaw (1988), Murphy and Zimmerman (1993), as examples.

find that firms that make bad acquisitions (as measured by reductions in their own equity values) subsequently become takeover targets. The acquisitions that reduce equity values are later divested either in bust-up takeovers or in restructuring programs designed to thwart the takeovers.

Weisbach (1995) examines another approach to disciplining management. He studies management turnover and divestitures of recently acquired divisions. At the time of a management change, there is an increased probability of divesting acquisitions (and recognizing the losses) or divesting acquisitions considered by the press to be unprofitable. He interprets this evidence as consistent with a variety of agency-based theories but does not evaluate whether the source of the problem is a cognitive bias in the decision-making of the manager who is replaced. Knowing whether underperformance is due to cognitive bias or agency cost may have significant implications for how boards of directors and other stakeholders monitor managers.

3 ANALYTICAL FRAMEWORK

We model the choice to retain/divest a player as being dependent on individual player statistics, experience, and contractual constraints, as well as managerial characteristics, and team performance. In order to differentiate the circumstances under which existing players were hired, we identify three different types of players: players hired by (i) the current manager, (ii) the immediate prior manager, or (iii) an even earlier manager. These classifications are simultaneously combined with the identification of players on teams with a new or continuing manager.

The unit of analysis in our study is a player-team-year. The specific outcome we examine is the probability that a player in a given year is divested from a team. We observe whether a player exits in the subsequent year so that he is no longer playing for his current team. We use the term "divestiture" to mean that the player is not observed on the same team in the subsequent year. We can examine the impact of changes in management on the probability of divestiture, controlling for player and team performance, manager career success, along with other variables that may affect the retention decision. Since the data do not indicate why players leave, we are not able to directly differentiate between involuntary separations (e.g., management-initiated terminations and trades) and voluntary separations (e.g., retirements). This could bias our analysis against finding an impact of managerial change and player performance on divestiture. Below, we adopt an approach to identify those least likely to have voluntarily terminated their MLB careers, and test the sensitivity of results to this subsample. The results are not affected in any substantive way.

In MLB, two types of managers may affect retention and hiring choices. The general manager (GM) typically controls player transactions and bears primary responsibility for contract discussions. The GM normally is the person who hires and fires the coaching staff, including the field manager and team coaches. Based on this job description, the GM is a close comparable of a CEO. However, in baseball parlance, the term "manager" almost always refers to the field or team manager (TM). The TM controls team strategy, sets the line-up, and determines the substitutions throughout the game. Because we are agnostic, *a priori*, about the relative importance of the two types of managers regarding player

retention, we include data on both and evaluate the importance of each on the divestiture and retention outcomes.

Based on the literature reviewed above, we develop empirical tests for three hypotheses, with the objectives of (1) evaluating possible explanations for managerial decisions regarding player retention and (2) differentiating between generic agency-cost explanations for managerial decisions and a more specific loss-aversion explanation.

H1 – Agency Costs: Agency costs can manifest in several ways including window dressing and career concerns. The former suggests that managers, regardless of whether new or continuing, and regardless of who hired the players, reset the annual roster by eliminating losers (those players with the worst performance statistics), so that the roster at the beginning of the season looks promising.[5] An alternative form of agency cost suggests that acquiring managers retain losers in an effort to hide their acquisition mistakes.

H2 – Strategic Redirection: New managers, wishing to start fresh by retaining players that maximize the quality of the matches between the new manager and the new roster of players, make changes across the roster, so that divestitures are not focused exclusively on players with poor performance statistics.

[5] "Window dressing" is a phrase that commonly refers to managers in the money management industry who sell stocks with poor previous performance and take positions in stocks that have performed well. Investors, upon seeing a portfolio loaded with top-performing stocks, may be more likely to remain invested with the manager despite poor fund performance over the previous period.

H3 – Loss Aversion: Due to the previous manager's loss aversion, new managers are more likely to rid the team of low performers hired by the previous manager than are continuing managers. The tendency for loss aversion applies to the previous manager who acquired the players and who fails to divest the low performers.

Equation (1) provides the first model we use to examine the probability of player retention:

$$Pr\left(y_{1ij(t+1)} = 1\right) = F\left(\alpha_1 + \mathbf{x}_{ijt}\boldsymbol{\beta}_1 + \mathbf{w}_{jt}\boldsymbol{\gamma}_1 + \theta m_{jt} + \delta q_{ijt} + \phi_1 z_{ijt}\right) \quad (1)$$

where the *i*, *j*, and *t* subscripts denote player, team, and year, respectively. The value of y_1 is equal to 1 if the player is not observed on the same team as in the prior year (divestiture), 0 otherwise, and *F* is the standard cumulative normal distribution. The **x** vector includes player performance statistics (we measure player performance with at-bats and slugging percentage, averaged over (up to) three prior seasons), experience (years in MLB), tenure with the team (in years), a dummy variable indicating if a player's contract included a no-trade clause, and a dummy variable indicating if the player is a "Low Performer" (in the bottom quartile of both performance statistics of all players in a given year). The vector **w** includes the team's winning percentage (averaged for up to three prior seasons), and the manager's experience and career winning percentage. The variable *m* is a dummy variable indicating, alternatively, that the GM is new to the team, the TM is new, or both managers are new, and *q* is the interaction of the New Manager and Low Performer

dummy variables. We also include a dummy variable, *z*, to control for whether the new manager and player were previously matched on a team.

Referring to equation (1), we expect that individual performance is a primary determinant of player divestiture, as good performers are expected to create more wins for the team, thereby attracting more attendance and providing incentives for managers to commit more resources to retaining those players. Similarly, players with longer tenure on a team are likely to become symbolic ambassadors for their organizations and may have accumulated specific skills (e.g., familiarity with the organization's goals and strategies), so they are also expected to have lower exit propensities. However, holding individual performance and tenure constant, it is not clear how MLB experience, which is correlated with player age, will affect retention probabilities. If MLB experience allows players to acquire desirable but unobservable qualities (e.g., leadership skills), then exit probabilities may be negatively correlated with experience. On the other hand, if goals of short-term success are more important, managers may be inclined to choose younger players over those with more experience.

Another factor expected to affect player divestiture is organizational success (measured as win percentage over *t*, *t* - 1 and *t* - 2). If players find successful teams more desirable, they will be less likely to leave voluntarily. In addition, managers who have been successful with a particular group of players may be reluctant to make personnel changes. Therefore, *ceteris paribus,* we expect better team performance to be associated with lower divestiture probabilities.

The presence of a new manager is likely to be correlated with team historical winning percentage. While the impact of managerial turnover on team performance is not

the focus of this paper, we control for the possibility that team performance may affect the probability of a player being terminated. Because the unit of analysis is the player and not team turnover, simultaneity is not a significant concern.

Contractual commitments can restrict the ability of teams to terminate players. The most recent and increasingly popular innovation is the "no-trade" clause, which gives players the contractual option of limiting their trade to a preferred group of teams or rejecting any trade altogether.[6] Consequently, a player with a no-trade clause in his contract is less likely to be divested.

To test our hypotheses regarding the impact of management on player retention, we include two sets of variables—one identifies whether the management is "new" and the other identifies the interaction of Low Performer with New Manager. We do not observe when, during the season, the new manager comes on board, but instead observe the team's managers at the beginning of each season. It is reasonable that it would take a season to make the changes in personnel that the new manager deems necessary; hence, we define a New Manager (GM or TM) as one in his first or second year with the team.[7]

The agency cost hypothesis (*H1*) can manifest itself through window dressing, for example, which suggests that the presence of a new manager does not drive the decisions to divest players. Rather, the decisions arise from the incentive for managers (new or continuing) to make the roster look better by ridding the team of players with the lowest performance statistics. The hypothesis implies that low performance will have a positive impact on divestiture, holding the status of the manager constant. While it is possible that

[6] On occasion, players waive their right to exercise this option, but with substantial monetary compensation.
[7] The chosen window is supported by a report in *The* Economist (2001), "To Cut or Not to Cut." February 10, pp. 67-68. The report indicates that, in most industries, newly hired managers face the most intense pressure to make personnel changes within their first 2 years.

managers are weeding out poor performers, there is a concern, as there is in corporate settings, that managers make cosmetic changes, presumably to make themselves better off. Given the statistical property of reversion to the mean, it is not clear why managers would engage in this behavior as owners, fans, and other stakeholders can anticipate mean reversion and, hence, may not be fooled by window dressing. Still, the evidence on window dressing in other settings is compelling, and given the short-run horizon of most managers (average tenure of 4.3 and 3.1 years for GMs and TMs, respectively), it is a plausible form of agency cost. Under this version of the agency cost hypothesis, the Low Performer dummy variable is expected to be positively associated with turnover (holding constant manager status, and player and team performance).

The second hypothesis (*H2*) regarding new strategic direction implies that the presence of a new manager will increase the likelihood of player divestiture, other things constant. Unlike *H1*, this hypothesis is not necessarily an agency cost, as perhaps the manager has insights that others do not. Moreover, it does not suggest a necessary statistical relationship between low player performance and divestiture. The idea is that the new manager, in developing the roster, combines existing players with new players that fit his strategic vision and maximizes the quality of the player-manager matches. While we do not observe the strategy underlying the hiring decisions, the hypothesis suggests a positive relationship between player divestiture and the variables: New GM, New TM and/or New GMTM (both managers are new), other things constant. Under *H2*, there is no clear expectation regarding the interaction variables. Moreover, there is no clear expectation regarding whether the player was hired by the immediate previous manager or an earlier manager.

In contrast to *H1* and *H2*, the third hypothesis (*H3*) suggests that the new manager is hired when a previous manager has failed to allocate resources optimally, and in particular, has failed to rid the team of low-performing players whom his immediate predecessor hired. The implication is that likelihood of divestiture goes up when (1) the manager is new and (2) the new manager is simultaneously confronted with a specific class of players—low performers hired by the previous manager. New managers will behave differently than continuing managers when confronted with poor performers. The predicted sign on the interacted variable (Low Performer * New Manager) is positive. The default comparison group is players who are managed by continuing managers and who are not in the bottom quartile for performance.

While equation (1) is a useful model for examining the presence of a behavioral bias, generally, it does not fully address the more specific question of whether we can attribute loss aversion to the acquiring manager. For estimating equation (1), we use all player-team-year observations, including players on teams with new and continuing managers.

However, to assess whether it is the acquiring manager who displays a behavioral aversion to admitting mistakes, we test *H3* by estimating a second model using a sub-sample of players on teams with new mangers and who were acquired at some point prior to the current manager's tenure. That way, we can evaluate the specific hypothesis that the new manager, who has inherited a low-performer, reverses the decision of the *acquiring* manager. This can be formally examined by estimating equation (2):

$$Pr\left(y_{2ij(t+1)} = 1\right) = F\left(\alpha_2 + \mathbf{x}_{ijt}\boldsymbol{\beta}_2 + \mathbf{w}_{jt}\boldsymbol{\gamma}_2 + \lambda r_{ijt} + \psi s_{ijt} + \phi_2 z_{ijt}\right) \qquad (2)$$

where *r* is a dummy variable indicating the player was acquired by the immediate predecessor (the reference group consists of players acquired any time prior to the immediate predecessor's tenure) and *s* is the interaction of *r* with the Low Performer dummy. The dependent variable, y_2, is now equal to 1 if the player was acquired by an earlier manager and is not observed on the same team (divestiture) in year $t + 1$, 0 otherwise. With this specification, we can test a primary implication of *H3,* that the interaction variable will be positive—new managers come on board and remove the poor-performers who were acquired by the new manager's predecessor.

A positive coefficient on the interaction term means that the acquiring manager failed to divest a poor performing player. This could be because of behavioral bias of loss or because the manager is aware he made a mistake but, because of career services, does not want to admit it by divesting the player. We can distinguish between these two possibilities by assessing whether the acquiring manager had an established reputation earned through experience as a manager. Experienced managers are less likely to have career concerns related to admitting mistakes than are inexperienced managers. This assumes that the manager is aware of the hiring mistake that he made; however, it a manager displays a behavioral bias it is not an explicit agency cost.

4 DATA

Our full sample consists of 15,880 player-team-year observations. These are based on MLB team roster appearances from 1976 through 2005 for individuals with no missing information on batting performance. We selected these years to include all available data

since "free agency" was instituted in December, 1975.[8] Player performance information is acquired from *Lahman's Archive* and *USA Today*, while no-trade clause data is gathered from the MLB.com web-site. Since the source data begins in 1949, we are able to accurately calculate player experience and tenure, even for the early years of our sample period. This information also allows us to match a team's acquisition of a player to a particular GM and TM, even if it occurred prior to 1976. Teams are uniquely identified in the source data according to their name and/or location. For analysis purposes, teams are coded as new franchises only if a franchise location change is observed.

We use batting statistics because we are interested in measuring individual performance rather than joint performance. In contrast to pitching and defensive statistics (fielding performance), posting of hitting statistics is largely independent of teammates. In addition, there is considerable judgment involved in measuring defense (e.g., fielding errors). As Bradbury (2007) reasons and documents, "although some teammate spillovers may occur from batter to batter, the spillovers on defense are much more problematic." For example, a pitcher with a good defense may have an excellent earned-run average substantially due to his fielders.[9]

Table 1 contains definitions and descriptive statistics of the variables used in the models. As shown, on average, 42 percent of the observations are associated with player divestiture. Players are separated into quartiles of performance, where the quartile is defined using all the players in a given year and represents the bottom 25% of the three-

[8] Prior to a legal ruling in 1975, all players were restricted agents who were the property of the team who hired them unless they were traded or released.
[9] See discussion in Bradbury (2007), pgs. 183-185. Also, pitchers can be starters, relievers, closers, so that the timing of their entrance into the game can potentially contaminate the attribution of outcomes to individual performance.

year average in both Slugging and At bats at time *t*. The three-year average uses *t*, *t* - 1, and *t* - 2. If *t* - 2 does not exist for a player at a given point in time, then it is the average of *t* and *t* - 1. If the player is a rookie, then it is performance at time *t*. Players, on average, have 6.3 years of experience in MLB, compared to 5.7 for GMs and 9.0 for TMs. Players on average have nearly 3 years of tenure with a specific team. As shown, 33% of observations are associated with new GMs (defined as in their first or second year with a team), 53% are associated with new TMs, and 22% with new TMs and GMs. There are very few cases in our sample where the player and manager have previously been matched on a previous team (less than 1 percent for the GM or TM).

5 RESULTS

Table 2 contains tests of difference in means of key variables for observations associated with subgroups (divested versus retained players, new versus continuing GMs, and new versus continuing TMs).[10] Panel A documents that the group of divested players is different from the group of retained players. Not surprisingly, on average, retained players are better performers and are less likely to be associated with new management. More experienced GMs are more likely to be associated with a divested player. If a player is a low-performer, that player is more likely to be divested if the management is new. Also, if a player and manager had been matched on a previous team, there is a higher probability of that player being divested when a new manager confronts the player again.

Panels B and C illustrate that, across many characteristics, the rosters of teams led by continuing managers are different from those led by new managers. Player slugging

[10] While not shown, rank sum chi-square tests of differences in medians show that the medians for the subgroups are significantly different from each other for each variable where the means are different.

average and tenure with the team are higher for teams led by continuing versus new managers. Not surprisingly, continuing team managers are associated with more successful teams as measured by team winning percentage.

Table 3 shows results of estimating equation (1) using three specifications: Model 1 includes the New GM indicator and the interaction of New GM with Low performer; Model 2 includes the New TM indicator and the interaction of New TM with Low performer; Model 3 includes an indicator variable (GMTM) that equals 1 if the observation is associated with a New GM and a New TM, and an interaction of GMTM with Low performer. The results for the models in this table are based on data for all players and all managers. We include both linear probability model (LPM) estimates and probit estimates, following the advice of Ali and Norton (2003) who argue that the marginal effects on interaction terms in probit can be misinterpreted because the estimated coefficients do not fully account for the interactive nature of the explanatory variables.

The results show that the performance statistics, At bats and Slugging, and Low performer, have the expected signs, as low performers are more likely to be divested. These results (and Table 4 to follow) are not sensitive to using other measures of performance, such as Batting average or On base percentage. The results are consistent with window dressing or career concerns motivations for new and continuing managers. If a manager is window dressing or trying to signal managerial acumen, they presumably would single out the worst performers for removal. However, the results are not consistent with what we expect if a new manager is implementing a "new strategic direction" or otherwise is trying to improve the quality of player-manager matches. For this sample, the presence of a New GM does not, by itself, affect the choice to divest a

player, nor does having an entirely new management team (New GMTM). A New TM does have a marginally significant positive effect on divestiture (in the probit specification only, however).

While not definitive, Table 3 also provides support for the loss aversion hypothesis. When new managers are confronted with low-performers acquired by a previous GM or TM, they are more likely to divest those players than better-performing players. The interaction effects (bolded) are all positive and significant (but weaker for New TMs). On the other hand, the results could also be consistent with new managers acting on career concerns and being more aggressive at window dressing than are continuing managers.

Table 4 tests for a more specific effect of loss aversion. In contrast to Table 3, which includes observations on all players and managers, Table 4 results are derived using the subsample of observations where the manager is new (2,455 player-team-year observations with a new GM and 4,210with a new TM). This table can be used to examine retention choice differences for players acquired by the immediate preceding manager (compared to those acquired by an earlier manager) and allows us to evaluate whether new manager choices regarding player retention can be traced to the acquiring manager's avoidance of recognizing a loss. The final two columns of the table show the summary statistics for the subsample of new GM and new TM observations, respectively. As the loss aversion hypothesis suggests, when previous managers make mistakes in the hiring or buying of assets, their reluctance to rid the organization of the inefficiency is "undone" by new managers who inherit the player from the acquiring manager. In particular, when new managers are confronted with low performers acquired by his immediate predecessor, they are more likely to divest the player. As shown, being a low-performer, by itself, does

not lead to a greater likelihood of the player being divested. This behavior is not consistent with new managers engaging in window dressing. In contrast to Table 3 results, the variable Low perform coefficient is not statistically significant. Hence, when we limit the sample to players on teams with new managers, low performance, by itself, does not drive the decision to retain or divest a player. Similarly, the fact that a player was acquired by a previous manager does not, by itself, drive the decision.

Instead, the results indicate that new managers (GMs) appear to divest specific players—those who were acquired by the immediate preceding manager and who are low-performers. The coefficients and significance tests for this interacted variable are bolded in Table 4. The implication is that the preceding GM had a behavioral bias toward retaining a player whom he hired and who is revealed as a poor-performer. The new GM reverses the decision of his predecessor. While the signs of the coefficients for this interacted variable are also positive for TMs, they are not statistically significant, which suggests that new TMs are not as likely to drive decision making as new GMs.

The probit results generally are consistent with the OLS results. However, given the previously discussed reliability issues with the probit interaction coefficients, we focus our attention on the LPM estimates. The interacted variable in the first LPM indicates that when the GM is new and the previous GM was responsible for acquiring the player who is under-performing, a player's likelihood of divestiture increases by 26 percentage-points relative to the default set of players. The default consists of those low performing players who were acquired by another manager—not the immediately preceding manager. It does not appear that the status of being acquired by a previous manager is viewed negatively by

the new GM—rather, low performance combined with acquisition status leads to a higher probability of divesting the player.

The positive impact of the interacted variable for GMs, however, could be consistent with career concerns or loss aversion. Career concerns may prompt the acquiring manager to either hide a mistake or to avoid admitting a mistake (avoided by retaining the player whom he acquired rather than by divesting him). Failure to divest could also be consistent with a behavioral bias of loss aversion. We cannot know for sure what is in the mind of the acquiring manager, but we can attempt to distinguish these two possibilities empirically. We can measure the experience of the acquiring manager, which is expected to be positively associated with reputation. Presumably those managers with less of a reputation are those with more acute career concerns. If experience is negatively associated with career concerns then we can test the hypothesis that the probability of a new manager divesting a poor performing player is higher when the experience of the previous (acquiring) manager is low. To evaluate this we determine the experience of the acquiring GMs as of the time the player was acquired (mean of 5.37 years). We estimated table 4 regressions for two samples: those observations where the acquiring GM had less than or equal to 5 years of experience and those with more than 5 years. The samples are of approximately equal size. The career concerns hypothesis suggests a greater probability of divestiture for observations where the acquiring manager had less experience (a larger and positive coefficient for the interacted variable) compared to those where the acquiring manager had less experience. Loss aversion is not expected to be affected by experience, however. The results show that the coefficients on the interacted variables are not significantly different for these two groups (t statistic = 0.59). It appears that that new

managers who divest low performers acquired by previous managers are doing so in response to their predecessor's loss aversion rather than a response to the previous manager's effort to hide hiring mistakes.

As discussed above, we do not observe whether the divestiture was initiated by the player or the manager. The presence of voluntary divestitures in the data reduces the likelihood of finding a relationship between performance, acquisition status, and player terminations. To address this issue, we re-estimated the regressions on a subsample of players who are not eligible for free agency. [11] The results are similar to those in Tables 3 and 4; all coefficients have the same sign, approximately equivalent magnitudes and similar levels of statistical significance, although the significance levels for the GM variables are stronger for the Table 4 specifications than for the full sample.[12]

As a final robustness check, we re-estimated Tables 3 and 4 on two different time periods, where one might plausibly argue that performance statistic and hiring decisions might differ: the period prior to the introduction of interleague play and the period after (1976-1996 and 1997-2005, respectively). The rationale is that the two leagues have different rules regarding designated hitters (DH), with the DH rule used in AL ballparks but not in NL. The results are not significantly different across the two time periods.[13]

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[11] These are players with less than 6 years of experience. Bollinger and Hotchkiss (2003) similarly identify reserve clause players who are tied to one team by an agreement that that does not allow salary negotiations during the player's first 3 years as a major league player (after three years, a player is entitled to a salary arbitration). With 6 years of service, the player is eligible for open contract negotiations. They point out that free agents are considered to have more mobility than reserve clause players, but they too can be locked into multi-year contracts.

[12] Results are available from the authors upon request.

[13] The following are the t-statistics (p-values in parentheses) for differences in the coefficients of interest, for Table 3: New GM * Low performer: 0.60 (0.55); New TM * Low performer: 0.33 (0.74)
New GMTM * Low performer: 0.35 (0.73); and for Table 4: Acq. previous GM * Low performer: 1.49 (0.14), and Acq. previous TM * Low performer: 1.40 (0.16).

6 DISCUSSION

There are many reasons why managerial changes occur and varied expectations for what will occur after the managerial change. One possible explanation for why new managers are brought on board is that previous managers are unwilling to admit or unable to recognize mistakes and terminate poorly-performing projects, assets or employees. This behavior, sometimes referred to as loss aversion, is inefficient but difficult to distinguish from managerial inefficiency arising from agency costs.

While many psychological studies address cognitive bias associated with loss, and there are many studies documenting agency costs in managerial decisions, we are unaware of any study that explicitly links them with empirical tests that can distinguish between the two potential explanations for the failure of managers to rid the organization of losers. In this paper, we provide an approach for evaluating the two as distinct hypotheses using data from MLB. One significant advantage of sports data is that manager and player changes are regularly observable, relative productivity is transparent and measurable, and hiring decisions can be traced to a specific manager.

We find that new managers are not more likely to "window dress" their rosters than are continuing managers. Our regression analysis suggests that it is the *interaction* of a new manager confronted with a player who is a low-performer that significantly influences whether the player is divested. The most important finding, however, is that general managers (the baseball equivalent of a CEO) display behavior consistent with loss aversion in that it is the acquiring manager who is reluctant to divest poor performers. Specifically, new general managers are more likely to divest players when the poor-performing player was acquired by the previous manager, as opposed to having been acquired by an even

earlier manager. It appears that team owners may hire new managers, in part to reverse player acquisition decisions of the current managers. Again, it is not that new managers rid the team of all poor performers or simply divest players who were hired by a previous manager. Instead, they appear to address a specific behavioral problem associated with the preceding manager who acquired the poor-performer—namely, the tendency to hold-on-to-losers.

While we use baseball data to evaluate the hypotheses, the findings have implications for the broader market of CEOs and high-level managers. If loss aversion is suspected, there may be ways for owners or boards of directors to address the specific behavioral issue more directly rather than resorting to replacing the manager.

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Table 1

Variable Definitions and Summary Statistics

The table shows variable definitions and summary statistics for 15,880 player-year observations for MLB batters, 1976-2005. All variables are defined for player *i*, team *j*, year *t*, unless otherwise noted.

Variable Name	Definition	Statistic		
		Mean	**Median**	**Std. Dev.**
Player Turnover, Performance and Experience				
Player separation	1 if player is not observed on the team in year t+1; 0 otherwise	0.4244	0.0000	0.4943
Slugging	Slugging average= (total bases / at bats), excludes walks; averaged over (up to) three seasons (t, t-1 and t-2)	0.3659	0.3737	0.1356
At bats	Total plate appearances; averaged over (up to) three seasons (t, t-1 and t-2)	229.73	188.33	183.67
Experience	Player experience, measured as years in MLB	6.2920	5.0000	4.4509
Player tenure	Player tenure, measured as years with current team	2.7176	2.0000	2.4799
No-trade clause	1 if player contract includes a no-trade clause; 0 otherwise	0.0052	0.0000	0.0717
Low performer	1 if player performance is in lowest quartile for all players, measured by Slugging or At bats, or both; 0 otherwise	0.1491	0.0000	0.3562
Team and Manager Characteristics				
Win percent	Team winning percentage, averaged over t, t-1 and t-2	0.4974	0.5000	0.0699
American League	1 if team is in American League; 0 otherwise	0.5545	1.0000	0.4970
New GM	1 if the GM associated with the player-year observation is in his first or second year with team; 0 otherwise	0.3288	0.0000	0.4698
New TM	1 if TM associated with the player-year observation is in his first or second year with team; 0 otherwise	0.5283	1.0000	0.4992
New GMTM	1 if both GM *and* TM are new (in first or second year with team); 0 otherwise	0.2236	0.0000	0.4166
GM experience	GM experience, measured as GM years in MLB	5.7116	4.0000	4.6472
TM experience	TM experience, measured as TM years in MLB	8.9808	7.0000	7.2334
GM career win percent	GM winning percentage, averaged over entire career	0.4959	0.4931	0.0545
TM career win percent	TM winning percentage, averaged over entire career	0.4975	0.5003	0.0521

Player-Manager Matching Characteristics				
New GM * Low performer	1 if GM is new *and* player is a low performer; 0 otherwise	0.0486	0.0000	0.2151
New TM * Low performer	If TM is new *and* player is a low performer; 0 otherwise	0.0808	0.0000	0.2725
New GMTM * Low performer	1 if both GM *and* TM are new *and* player is a low performer; 0 otherwise	0.0339	0.0000	0.1811
New GM * Player match	1 if GM is new *and* player-GM combination was observed on a previous team; 0 otherwise	0.0024	0.0000	0.0489
New TM * Player match	1 if TM is new *and* player-TM combination was observed on a previous team; 0 otherwise	0.0084	0.0000	0.0915
New GMTM * Player match	1 if GM *and* TM are new *and* player-GM *or* player-TM combination was observed on a previous team; 0 otherwise	0.0108	0.0000	0.1032

Table 2

Univariate Tests: Divested vs. Retained Players and New vs. Continuing Managers

The table tests for statistical differences in mean characteristics by three sub groupings. Panel a shows mean differences in variables for those players who were divested (separated from the previous year's team) and those who were retained by that team. Panels B and C show mean differences in variables depending on whether the general manager (team manager) is new versus continuing. Tests are based on 15,880 player-year observations, 1976-2005. All variables are defined in Table 1. Statistical significance at the 1%, 5%, and 10% levels in two-tailed tests is indicated by ***, **, and *, respectively.

	(A)			(B)			(C)		
	Player Divested	**Player Retained**	**Mean Diff.**	**GM New**	**GM Continuing**	**Mean Diff.**	**TM New**	**TM Continuing**	**Mean Diff.**
Variable Name	**Mean**	**Mean**	**t-test**	**Mean**	**Mean**	**t-test**	**Mean**	**Mean**	**t-test**
Slugging	0.3326	0.3904	27.17***	0.3610	0.3683	3.17***	0.3608	0.3716	5.05***
At bats	167.3460	275.7291	38.42***	230.8254	229.1901	-0.53	228.2312	230.1586	0.55
Experience	7.0007	5.7694	-17.39***	6.2942	6.2909	-0.04	6.1976	6.3977	2.83***
Tenure	2.3825	2.9647	14.72***	2.5821	2.7839	4.82***	2.6156	2.8318	5.49***
No-trade clause	0.0007	0.0084	6.69***	0.0033	0.0061	2.35**	0.0042	0.0063	1.85***
American League	0.5481	0.5593	1.41	0.5313	0.5659	4.12***	0.5710	0.5361	-4.42***
Low performer	0.2322	0.0879	-25.76***	0.1479	0.1497	0.31	0.1529	0.1448	-1.43
Player divested				0.4267	0.4233	-0.41	0.4368	0.4106	-3.33***
Win percent	0.4929	0.5007	6.95***	0.4892	0.5014	10.35***	0.4879	0.5079	18.20***
New GM	0.3306	0.3275	-0.41						
New TM	0.5436	0.5170	-3.33***						
New GMTM	0.2320	0.2173	-2.21**						
GM experience	5.8212	5.6307	-2.55***	3.7123	6.6909	39.79***	5.1259	6.3675	16.96***
TM experience	9.0557	8.9256	-1.12	8.3030	9.3136	8.29***	7.3242	10.8310	31.41***
GM career win percent	0.4950	0.4966	1.89*	0.4919	0.4979	6.51***	0.4864	0.5065	23.62***
TM career win percent	0.4952	0.4992	4.71***	0.4917	0.5003	9.76***	0.4868	0.5094	27.91***
New GM * Low performer	0.0792	0.0260	-15.52***						
New TM * Low performer	0.1307	0.0440	-20.07***						
New GMTM * Low performer	0.0574	0.0166	-14.12***						
New GM * Player match	0.0033	0.0018	-1.93**						
New TM * Player match	0.0111	0.0065	-3.18***						
New GMTM * Player match	0.0142	0.0082	-3.64***						
No. of Obs.	6740	9140		5221	10659		8389	7491	

Table 3

Regression Models of Player Divestitures, All Players

The table shows results of two types of regressions (linear probability models and probit models), where the dependent variable equals 1 if the player was divested from team in the subsequent year and 0 otherwise. Regressions include all 15,880 players. The linear models report the coefficient and robust standard error; the probit models report the marginal effect and robust standard error. Statistical significance at the 1%, 5%, and 10% levels in two-tailed tests is indicated by ***, **, and *, respectively. All models include a league dummy, year fixed effects, and team fixed effects.

	Linear Models			**Probit Models**		
Independent Variables	**1**	**2**	**3**	**1**	**2**	**3**
Slugging	-0.3986***	-0.3961***	-0.3949***	-0.4499***	-0.4475***	-0.4461***
	0.0519	0.0517	0.0516	0.0689	0.0684	0.0682
At bats	-0.0008***	-0.0008***	-0.0008***	-0.0010***	-0.0010***	-0.0010***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Experience	0.0320***	0.0321***	0.0320***	0.0374***	0.0375***	0.0374***
	0.0009	0.0009	0.0009	0.0011	0.0011	0.0011
Player tenure	-0.0031*	-0.0029*	-0.0029*	-0.0024	-0.0022	-0.0022
	0.0017	0.0017	0.0017	0.0020	0.0020	0.0020
No-trade clause	-0.2434***	-0.2454***	-0.2458***	-0.3204***	-0.3211***	-0.3217***
	0.0319	0.0320	0.0321	0.0410	0.0409	0.0407
Win percent	-0.4967***	-0.4205***	-0.4419***	-0.5947***	-0.5081***	-0.5306***
	0.0649	0.0592	0.0667	0.0766	0.0697	0.0786
GM experience	0.0010		0.0015	0.0010		0.0017
	0.0010		0.0010	0.0012		0.0011
TM experience		0.0009	0.0007		0.0010	0.0007
		0.0006	0.0006		0.0007	0.0007
GM career win percent	-0.0002		0.0389	-0.0200		0.0336
	0.0911		0.0935	0.1080		0.1111
TM career win percent		-0.2242***	-0.2640***		-0.2747***	-0.3217
		0.0853	0.0861		0.1024	0.1036
Low performer	0.0601***	0.0550***	0.0624***	0.0567***	0.0518**	0.0593***
	0.0172	0.0195	0.0166	0.0207	0.0231	0.0200
New GM	-0.0059			-0.0077		
	0.0092			0.0108		
New GM * Player match	0.0450			0.0616		
	0.0678			0.0854		
New TM * Player match		-0.0216			-.0272	
		0.0418			.0494	
New GMTM * Player match			-0.0072			-.0085
			0.0364			.0437
New GM * Low performer	**0.0445****			**0.0531****		
	0.0213			**0.0253**		
New TM		0.0126				
		0.0086			0.0173*	
					0.0102	

New TM * Low performer		**0.0386***			**0.0439***	
		0.0202			**0.0235**	
New GMTM			0.0051			0.0057
			0.0104			0.0122
New GMTM * Low performer			**0.0594*** **			**0.0734*** **
			0.0233			**0.0288**
R-sq/Pseudo R-sq	0.1857	0.1863	0.1864	0.1500	0.1506	0.1506

Table 4

Models of New Manager Choices to Divest Players when Player was Acquired by the Previous Manager

The table shows the results of two types of regressions (linear probability models and probit models), where the dependent variable equals 1 is the player was divested from the team in the subsequent year and 0 otherwise. The sample is limited to teams with new managers (either TM or GM) and only those payers who were hired by an earlier manager."Acq. previous TM" and "Acq. previous GM" mean, respectively, that the player was acquired by the manager who immediately preceded the current manager. The default group is players who were acquired by an even earlier manager. The linear models report the coefficient and robust standard error. The probit models report the marginal effect and robust standard error. Statistical significance at the 1%, 5%, and 10% levels in two-tailed tests is indicated by ***, **, and *, respectively. All models include a league dummy, year fixed effects, and team fixed effects. Mean and standard deviation statistics for each independent variable are show in the final two columns.

	Linear Models		**Probit Models**		**Summary Statistics: Mean and Std Dev.**	
	1	**2**	**1**	**2**		
	GM New	**TM New**	**GM New**	**TM New**	**GM New**	**TM New**
Independent Variables	**Coef./SE**	**Coef./SE**	**dy/dx SE**	**dy/dx SE**		
Slugging	-0.5086***	-0.6237***	-0.5765***	-0.7491***	0.3787	0.3782
	0.1312	0.0954	0.1537	0.1194	0.0943	0.0973
At bats	-0.0007***	-0.0007***	-0.0008***	-0.0008***	293.77	287.18
	0.0001	0.0001	0.0001	0.0001	177.47	173.61
Experience	0.0292***	0.0318***	0.0329***	0.0364***	7.2253	7.0240
	0.0024	0.0018	0.0029	0.0022	4.2883	4.2879
Player tenure	-0.0057	-0.0052	-0.0053	-0.0050	4.1259	4.0311
	0.0041	0.0035	0.0045	0.0038	2.8258	2.6588
Win percent	-0.6096***	-0.3340***	-0.6917***	-0.3810***	0.4932	0.4900
	0.2072	0.1292	0.2350	0.1474	0.0714	0.0641
No trade clause	-0.2382**	-0.1959***	-0.2712**	-0.2494**	0.0049	0.0052
	0.1152	0.0685	0.1178	0.0866	0.0698	0.0721
GM experience	-0.0005		-0.0004		3.4452	
	0.0027		0.0031		4.6503	
TM experience		0.0023**		0.0027**		7.1164
		0.0011		0.0013		7.0941
GM career win percent	-0.0618		-0.1098		0.4959	
	0.2271		0.2588		0.0653	
TM career win percent		-0.0451		-0.0490		0.4897
		0.1363		0.1581		0.0581
Low performer	-0.1024	-0.0006	-0.1153	-0.0016	0.0627	0.0689
	0.1538	0.0746	0.1369	0.0863	0.2425	0.2533
New GM * Player match	-0.1644		-0.1563		0.0016	
	0.2233		0.1877		0.2425	

New TM * Player match		-0.0417		-0.0288		0.0062
		0.0959		0.1069		0.0784
Acq. previous GM	0.0174		0.0223		0.7556	
	0.0265		0.0302		0.4298	
Acq. previous GM*Low performer	**0.2613***		**0.2909***		0.0587	
	0.1566		**0.1564**		0.2350	
Acq. previous TM		-0.0225		-0.0226		0.6081
		0.0177		0.0203		0.4882
Acq. Previous TM*Low performer		**0.1094**		**0.1059**		0.0591
		0.0786		**0.0950**		0.2359
R-sq/Pseudo R-sq	0.1710	0.1719	0.1388	0.1394		
N	2455	4210	2455	4210	2455	4210