# Stock Performance and Merger Choices

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**Abstract**

Firms that have experienced recent gains in the stock market are more likely to engage in deals that redraw their boundaries – whether by acquiring other firms, being acquired themselves, or by doing spinoffs. Merging firms also appear to match assortatively by stock performance: successful firms merge with other successful firms. I show how both these patterns arise naturally in a model where reorganization imposes nontrivial costs.

Assortative matching by stock performance is difficult to test directly. Showing that industry and time adjusted stock returns of merger partners are positively correlated is not sufficient. This is because the correlation could be driven by unmeasured operational similarities between merger partners rather than by similarity of financial performance per se. I propose another test for assortative matching based on market reactions to merger announcements. If firms sort by performance, and performance is not perfectly observed, then merger announcements will convey information to the market about the performance of firms. The market response to a firm announcing a merger would be increasing in its proposed partner's performance (since that is an indication that the firm itself is of high quality). And, holding constant the performance of the merger partner, the market response would be declining in the firm's own past performance (since that is an indication that the firm was previously overvalued). I find empirical support for this effect in the market response to merger announcements.

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## 1. Introduction

Mergers and other forms of restructuring activities have rightfully attracted a lot of attention in the academic literature, and we have learned a lot about these events as a result. For instance, we know that mergers occur in waves and are often tied to economic shocks [Mitchell and Mulherin (1996)], that mergers create value to shareholders with most of the gains going to the targets [Jensen and Ruback (1983); Jarrell et. al. (1988)] and that merger booms coincide with periods of high stock market valuations [Maksimovic and Phillips (2001)]. Theories of mergers have focused almost exclusively on the demand side of mergers: what benefits do firms (or in some theories, just the managers) expect from the merger? In principle, these benefits would be addressed by the literature on the theory of the firm. After all, mergers are reorganizations whose primary goal is to alter firm boundaries, and the literature on the theory of the firm begun by Coase (1937) attempts to address precisely the problem of explaining the boundaries of firms. Theories of the firm such as those based on the holdup problem [Klein et. al. (1978); Williamson (1985); Grossman and Hart (1987)] have found some empirical support in explaining the scope of the firm [e.g. Joskow (1985)]. But they are yet to be used successfully in explaining merger behavior, perhaps due to the difficulty of empirically measuring concepts like asset specificity. Theories of the benefits of mergers usually called upon are not as firmly rooted in a formal theory of the firm, but are nevertheless compelling. These models include the desire to monopolize markets, replace underperforming managers in targets, and

exploit the stock market overvaluation of the acquirer.

This paper shifts attention from the demand side of the equation (the benefits of redrawing firm boundaries) to the supply side of the equation (the cost of redrawing firm boundaries). While factors on the demand side of mergers or spinoffs such as the synergies or lack thereof between companies are undoubtedly the important drivers behind mergers, it would also seem reasonable that the costs of redrawing firm boundaries are not negligible. I show how a model based on costly reorganizations can help explain some empirical patterns in the relationship between the stock performance of firms and their choices and experiences when it comes to mergers and spinoffs. There are two patterns that I will explore in this paper.

The first pattern is an increased incidence of reorganization among firms that have done well on the stock market. An increase in a firm's stock performance makes the firm more likely to engage in a merger, whether as acquirer or as target. It also makes the firm more likely to engage in spinoffs. In my sample, an increase in past returns from 1 standard deviation below the mean to 1 standard deviation above increases the probability of becoming an acquirer by 91%, of becoming a target by 19%, and of engaging in a spinoff by 37%. Clearly, improved stock performance makes firms more likely to engage in deals like mergers and spinoffs that redraw their boundaries.

The second pattern is assortative matching by stock performance among merger partners. Establishing assortative matching by stock performance poses some problems. It is easy enough to show that successful firms, i.e. firms whose stock

have done well relative to others in their industry, tend to merge with other successful firms. In my sample, an increase in the target's past monthly excess stock returns (i.e., its returns in excess of the average for its industry and month) by 1 percentage point raises its acquirer's past monthly excess returns by .31 percentage points. Conversely, an increase in an acquirer's past monthly excess stock returns by 1 percentage point increases its target's monthly excess returns by .40 percentage points. The concern however is that the correlation could be driven by industry level shocks. I obtained the above numbers after controlling for industry at the level of the 49-industry Fama-French classification. But controlling for industry can never be fully convincing. Definitions of industries are always crude and one would suspect that unmeasured operational similarities between merging firms combined with industry-level shocks may be what is driving the correlation of financial performance among merging firms, rather than true sorting by financial performance per se.

To address this problem, I propose a test based on the market response to the merger announcement. The idea is straightforward. If firms sort according to their performance and performance is not perfectly observed by the market, then the announcement of a merger partner reveals information about the firm's own performance. An announcement of a merger with a successful partner reveals that the firm itself is successful, and stock prices will adjust accordingly. So holding constant a firm's own past performance, the market's response to a firm announcing a merger with a potential partner will be increasing in the performance of the partner. This is because the partner's success implies that the firm itself is

successful. Based on similar reasoning, if we hold constant the past performance of the firm's merger partner, the announcement response will be decreasing in the firm's own past performance. This is because the merger provides information that earlier high valuations are overoptimistic given the quality of the merger partner. I find empirical support for sorting by financial performance through this test. An increase in a merger partner's past monthly stock returns by 1 percentage point increases the market reaction to a firm's announcement of a merger (calculated as the returns to a firm's stock over a 7 working day window surrounding the announcement date) by 0.73 percentage points. And an increase in the firm's own past monthly returns by 1 percentage point lowers the announcement response by 0.85 percentage points.

Assortative matching by performance among merger partners and the increased incidence of mergers among successful firms are distinct facts in the sense that neither one implies nor is implied by the other. I propose a model that can help explain both patterns. The key element of the model is that mergers and, more generally, redrawing the boundaries of firms, is a costly undertaking. The costs may be due to the organizational and perhaps operational changes required to administer the new arrangement of resources. The larger the investment in the reorganization, the better the merged company functions as a unit. This is, of course, taking the stance that the typical merger is more involved than an acquirer simply serving as a holding company for the stock of the target firm. Some credence is lent to this claim by the efforts made and the difficulties encountered by acquirers trying to "digest" their targets and to unlock the expected synergies

from mergers. If one is willing to buy this view that a reorganization involves nontrivial costs, then it follows that reorganization is an investment more likely to be worth making for the more productive assets. The more successful the assets are, the larger the investment in reorganization they will merit. The similarity in their demand for reorganization investment leads firms to also match assortatively by their financial success. This is because when two firms are merging with each other, one cannot invest more in the merger of one firm and less in the merger of the other. So reorganization costs can potentially explain both the increased incidence of a reorganization among successful firms and the assortative matching by financial performance among the subset of firms that merge.

While this paper does not study the relationship between mergers and the business cycle, it should be mentioned that the model also provides an explanation for the procyclicality of mergers and other forms of asset reallocation documented in Maksimovic and Phillips (2001). The explanation is simple: investments are procyclical, so investments in reorganizations will be procyclical.

The evidence for assortative matching by financial performance is particularly interesting in light of a pattern in the theories about mergers. An interesting contrast, though not contradiction, arises when one compares industrial organization theories that emphasize operational and pricing considerations against theories that emphasize more the financial and managerial aspects of firms. Industrial organization theories can include both inefficiency theories based on the desire to monopolize a market as a merger motive [e.g. Stigler (1950); Perry and Porter (1985)], as well as efficiency theories that posit cost savings from mergers driven by

realization of economies of scale and scope [e.g. Maloney and McCormick (1988)]. A common theme among these models, however, is that they usually involve the merger of operationally similar firms. For example, obtaining monopoly power over the pricing of a product requires mergers between firms in the same market. Similarly, exploiting economies of scale typically entails leveraging a technology across similar lines of business. In contrast, when one looks at merger theories based on financial and managerial considerations, the models are often driven by a dissimilarity between the acquirer and target. For example, acquirers may be well managed firms seeking to acquire mismanaged firms and aiming to produce value by improving the target's management. Or perhaps acquirers may be overvalued or high q firms targeting undervalued or low q firms, replacing the target's low valuation with the acquirer's high valuation. Such considerations lend themselves naturally to a contrast between the acquirer's and target's financial or management characteristics. The contrast provides the underlying force behind a takeover which would serve to replace the target's bad characteristics with the acquirer's good characteristics. Examples of models that highlight a contrast between the characteristics of acquirers and targets include Manne (1965), Gort (1969), Jensen (1993), Jovanovic and Rousseau (2002) and Shleifer and Vishny (2003).

The industrial organization models of mergers and the financial models of mergers are not necessarily in contradiction with each other. Mergers may involve operationally similar firms that are financially dissimilar: for instance, a successful auto company buying up an unsuccessful one. Both classes of models have empirical backing. In support of the industrial organization models, firms typically

consist of similar lines of businesses and usually merge with firms in operationally similar lines of businesses. In support of the financial models, comparing certain features of acquirers and their targets bring up some marked contrasts. Target firms are much more likely to have their managers replaced after the merger [Martin and McConnell (1991)]. Merger announcements dramatically raise target stock while slightly devaluing acquirer stock [Andrade et. al. (2001)]. And acquiring firms tend to be more highly valued and to have performed better on the stock market than their targets. Though these findings of differences in the financial variables of merging firms are not inconsistent with assortative matching by financial performance, they do however make assortative matching a somewhat surprising feature of the data.

I proceed as follows. In Section 2, I present the theoretical model of merger choices when reorganization is expensive. In Section 3, I examine the empirical evidence for sorting by stock performance among merger partners, and for increased probability of reorganization among successful firms. Section 4 concludes.

## 2. A Model of Costly Reorganization

In this section, I show how making reorganization expensive leads fairly naturally to the set of empirical observations that we are seeking to explain. (1) Successful firms, i.e. firms whose stocks have performed well in the past, are more likely to undertake reorganization. (2) Firms match assortatively on the basis of past performance – successful firms are more likely to merge with other successful firms.

(3) The market's response to the stock of a firm announcing a merger is increasing in the past performance of the merger partner. Holding constant the quality of the merger partner, stock valuations are negatively related to the firm's own past performance.

## 2.1. Productivity and Reorganization Choices

### 2.1.1. Productivity and Merger Choices

There is only one good in the economy. A firm consists of a single asset – a tree that yields this good. There are two groups of firms, $X$ and $Y$, each consisting of a unit mass of firms. At time $t = 0$ all firms within a group look identical. At time $t = 1$, each firm receives a productivity shock. A firm that receives productivity shock $z$ yields $z$ units of the good. $z$ is uniformly distributed on $[0, 1]$. A firm from group $X$ can merge with a firm from group $Y$. If the firm from group $X$ has received a productivity shock $x$ and the firm from group $Y$ has received shock $y$, then the merger of these firms will yield $(x + y)(1 + q)$ where $q > 0$ refers to the quality of the merger. The production function for merger quality exhibits increasing marginal cost: a merger of quality $q$ costs $c_o + c_1 q^2$ to undertake. An important assumption here is that merger quality $q$ enters the production function multiplicatively rather than additively. The multiplicative assumption is more natural than an additive assumption in a merger setting since the gain from a merger is likely to build on the existing underlying productivity of the merging firms. Mergers are likely to amplify capabilities of firms rather

than add a lump sum value unrelated to underlying capabilities. As an example, suppose that a merger allows management to leverage best production practices from the two merging firms. Then the gains from the merger will be a function of the underlying productivities of the merging firms rather than independent of it.

For the sake of brevity in the following discussion, I will refer to a firm from group $X$ that receives productivity shock $x$ as firm $x$, and a firm from group $Y$ that receives productivity shock $y$ as firm $y$. The output from the merger of firms $x$ and $y$, net of the merger cost, would be

$$Y(x,y) = \max_{q}(x+y)(1+q) - \left(c_o + c_1 q^2\right)$$

The optimal level of merger quality that solves the above maximization problem is

$$q^* = \frac{x+y}{2c_1}$$

So the output of a merger between firms $x$ and $y$ would be

$$Y(x,y) = (x+y)(1+\frac{x+y}{2c_1}) - \left[c_o + c_1\left[\frac{x+y}{2c_1}\right]^2\right] \tag{1}$$

The surplus of the merger, defined as the additional production relative to if the two firms did not merge is

$$\begin{aligned} S(x,y) &= Y(x,y) - (x+y) \\ &= \frac{1}{4c_1}(x+y)^2 - c_o \end{aligned}$$

The merger surplus is increasing in firm productivity and decreasing in merger costs.

Reorganization, i.e. mergers between firms, take place at time $t = 2$. The reorganization specifies $X^m \subseteq X$, the subset of firms in group $X$ that merges with some firm in group $Y$, and a one-to-one mapping $M : X^m \to Y$ that specifies their merger partners in group $Y$. The restriction

$$\int_{x \in X} dM(x) = \int_{x \in X} dx \qquad \forall X \subseteq X^m \tag{2}$$

simply ensures that there is an equal number of firms on each side of a merger. The right hand side of equation (2) is the mass of group $X$ firms in the subset $X \subseteq X^m$, and the left hand side is the mass of their merger partners in group $Y$. These quantities should naturally be equal.

We are looking for the most efficient reorganization. This is the one that maximizes

$$\int_{x \in X^m} S(x, M(x))dx$$

**Theorem 1.** *The optimal reorganization merges only those firms that received productivity shocks greater than $\sqrt{c_1 c_0}$. Merging firms match assortatively according to their productivity shock: firm $x > \sqrt{c_1 c_0}$ from group $X$ merges with the equally productive firm $y = x$ from group $Y$.*

**Proof.** In our search for the optimal merger function, $M$, we will limit our

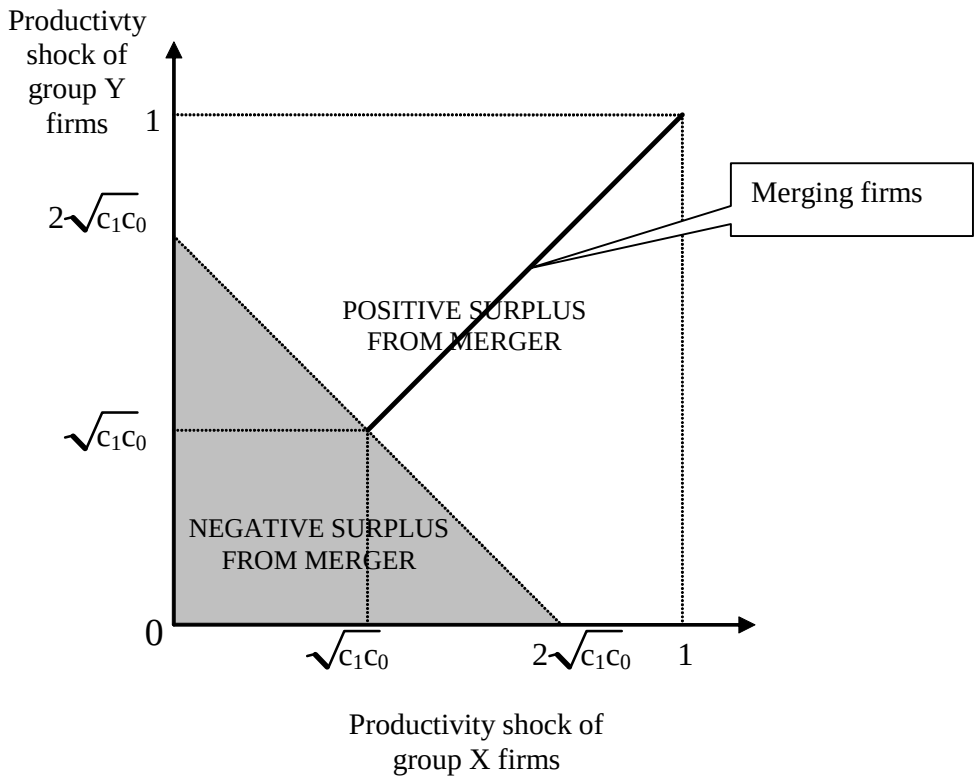


Figure 1: Merger Choices

attention to piecewise continuous functions. Since piecewise continuous functions can approximate just about every non-pathological function arbitrarily well, this causes no loss of generality from an economic standpoint. Figure 1 shows the space of potential mergers between firms. Group $X$ firms are represented by the interval $[0,1]$ of the $X$ axis, and group $Y$ firms are represented by the interval $[0,1]$ on the $Y$ axis. Note that there will be no mergers in the area shaded gray since the surplus for these mergers are negative. This is the region defined by

$$\begin{aligned} S(x,y) &< 0 \\ x+y &< 2\sqrt{c_1 c_o} \end{aligned}$$

The optimal merger function $M$ will lie outside this region. Divide $X=[0,1]$ into $N$ pieces. Consider potential merger functions, $M$, that are continuous on each piece. Within any piece, the slope of $M$ will have to be 1 or $-1$ to satisfy (2), the requirement that there be equal mass on either side of the mergers. The marginal benefit of matching firm $x$ to a higher productivity firm is

$$\frac{\partial S(x,y)}{\partial y} = \frac{x+y}{2c_1}$$

This is increasing in $x$, which creates complementarity between the productivities of merger partners:

$$\frac{\partial}{\partial x}\left[\frac{\partial S(x,y)}{\partial y}\right] = \frac{1}{2c_1} > 0 \tag{3}$$

This complementarity implies that within a given piece, the optimal merger func-

tion will have to have a slope of $+1$ rather than $-1$. Now compare two different pieces $X_L = [x_1, x_2) \subseteq [0,1]$, and $X_H = [x_3, x_4) \subseteq [0,1]$. Without loss of generality, let $x_2 < x_3$, so that $X_L$ refers to the lower productivity firms. Denote the merger partners of $X_I \subseteq X$, $I \in \{H, L\}$ as

$$M(X_I) = \{y \in Y : y = M(x) \text{ for some } x \in X_I\}$$

Since the merger function $M$ is one-to-one, the merger partners of $X_L$, $M(X_L)$, have to lie strictly above or below the merger partners of $X_H$, $M(X_H)$. The complementarity implied by (3) yields that they lie strictly above:

$$y_H > y_L \quad \forall \quad y_L \in M(X_L), \quad y_H \in M(X_H)$$

We now have that (i) the optimal merger function has a slope of $+1$ within any given piece, (ii) the optimal merger function is strictly increasing across pieces, (iii) mergers create positive surplus for firms with productivity greater than $\sqrt{c_1 c_0}$, and (iv) the merger surplus is increasing in firm productivity. Together, these results imply that the optimal merger function is a line of slope $+1$ stretching from the highest productivity firms $(1,1)$ down to the firms that are marginal in terms of having merger surplus $(\sqrt{c_1 c_0}, \sqrt{c_1 c_0})$. That is, the set of group X firms to be merged is $X^m = [\sqrt{c_1 c_0}, 1]$, and their merger partners are given by the merger function $M(x) = x$. ■

### 2.1.2. Productivity and Spinoff Choices

In the above discussion, we focused only on mergers. This was simply a modelling choice in that we only allowed for mergers and not spinoffs as possible reorganizations. The extension to spinoffs can be made readily by allowing spinoffs in the above model. The same forces that gave an increased probability of mergers among more productive firms will also give an increased probability of spinoffs. What the underlying model delivers is simply an increased probability of reorganizations among successful firms, if reorganizations are expensive. Whether the reorganization is a merger or a spinoff is not important.

The model can be altered as follows to focus on spinoffs. A firm that has received a productivity shock $x$, if split in half, will yield $\left(\frac{x}{2}\right)(1+q)$ from each half, where $q > 0$ refers to the quality of the spinoff. As in the merger analysis, the production function for spinoff quality exhibits increasing marginal cost: a spinoff of quality $q$ costs $c_o + c_1 q^2$ to undertake. Calculations similar to those performed in the previous section will yield that spinoffs, just like mergers, will be undertaken only by the more productive firms.

## 2.2. Stock Performance and Productivity

The connection between productivity and asset prices are straightforward in this model. The more productive firms are the ones that experienced greater stock price increases. At time $t = 0$ all firms are identical and have the same price, the expected future output. Assuming that the surplus of a merger between the

equally productive firms in groups $X$ and $Y$ are shared equally between the two firms, we have that the price for all firms at time 0 is

$$P_o = \int_0^1 \max\left[z, z + \frac{z^2}{2c_1} - \frac{c_0}{2}\right] dz \tag{4}$$

At time $t = 1$, the shocks are revealed, and the price of a firm of productivity $z$ becomes

$$P_1(z) = \max\left[z, z + \frac{z^2}{2c_1} - \frac{c_0}{2}\right] \tag{5}$$

Since the stock return of a firm of productivity $z$

$$r(z) = \ln \frac{P_1(z)}{P_0}$$

is increasing in the productivity shock it receives, stock performance reflects productivity and we obtain the empirical relationships between stock price performance and merger choices that is explored in this paper.

### 2.3. Assortative Matching and the Announcement Response

We turn now to exploring what effect a merger announcement might have on stock prices of the merger partners. In general, if partners sort according to some characteristic that is not perfectly observable, then the choice of one's partner reveals some information about the hidden characteristic that is sorted on. For example, if people sort by income in marriage, and income is only imperfectly observable to the outsider, seeing a person with low observed income marry a

person with high observed income will lead the observer to update upwards his estimate of the income of the poor partner and to update downwards his estimate of the income of the rich partner. In the context of our model, suppose that the productivity of a firm is observed with some error by the market. Since firms sort by productivity, the announcement by a firm of an impending merger with a successful firm signals to the public that the firm is itself of high productivity. So, holding constant a firm's own observed productivity, its return from a merger announcement is increasing in the observed productivity of its merger partner, since that signals that the firm's own productivity is high. On a similar note, holding constant the productivity of the merger partner, the return to a firm from its merger announcement is decreasing in its own observed productivity, since the merger provides information that the firm's observed productivity was overoptimistic given the quality of the merger partner.

To see this in the model, suppose that the public observes the productivity of a firm with an error $\varepsilon$. That is, a firm of productivity $z$ is measured by the public as being $z + \varepsilon$. Let $\varepsilon$ be independent of $z$ and distributed uniform $(-\theta, \theta)$. To simplify the model and focus attention on the announcement effect due to sorting, assume also that the surplus from the merger itself is negligible and do not materially affect asset prices. We will now prove the following result.

**Theorem 2.** *Let a firm, A, with period 1 stock price return $r_a$ merge with a firm, B, with period 1 stock price return $r_b$. The stock price return for firm A upon announcement of the merger will be increasing in its partner's past stock*

*performance* ($r_b$) *and decreasing in its own past stock performance* ($r_a$).

**Proof.** At time $t = 0$, we have that all firms have the ex-ante price

$$P_o = E[z] = \frac{1}{2}$$

At time $t = 1$, the productivity is observed with error as $z^m = z + \varepsilon$. What, now, is the new price? I will present the solution only for cases where the observed error $z^m \in [0, 1]$. Cases where this does not hold are slightly messier. Including them will not change the overall conclusions we make by analyzing the simpler case, so I will not present it. Upon observing $z^m \in [0, 1]$, the prices update to

$$P_1(z^m) = E[z|z + \varepsilon = z^m] = z^m \tag{6}$$

At time $t = 2$, mergers are announced. Firms know the productivity of all firms, so mergers proceed as described in the earlier sections. So there is perfect sorting by productivity: firms merge with firms of equal productivity. So if a firm of observed productivity $x^m$ merges with a firm of observed productivity $y^m$, we will have that both their prices update to

$$\begin{aligned} P_2(x^m, y^m) &= E[z|z + \varepsilon_x = x^m,\ z + \varepsilon_y = y^m] \\ &= \frac{x^m + y^m}{2} \end{aligned}$$

The market reaction to a firm of observed productivity $x^m$ announcing a merger

with a firm of observed productivity $y^m$ is

$$\begin{aligned} r^x(x^m, y^m) &= \ln\left[\frac{P_2(x^m, y^m)}{P_1(x^m)}\right] \\ &= \ln\left[\frac{1}{2} + \frac{1}{2}\left(\frac{y^m}{x^m}\right)\right] \end{aligned}$$

Note that the announcement response is increasing in observed partner productivity:

$$\frac{\partial r^x(x^m, y^m)}{\partial y^m} > 0$$

and decreasing in its own observed productivity:

$$\frac{\partial r^x(x^m, y^m)}{\partial x^m} < 0$$

Since the observed productivities $x^m$ and $y^m$ are the initial stock prices for their respective firms according to (6), we obtain that announcement responses are increasing in partner past stock performance and decreasing in own past stock performance. ■

### 2.4. Additional Discussion

Here I discuss some alternate models that can also potentially explain the data, the formal distinction between matching on performance versus matching on industry characteristics, and an assumption behind the market reaction test for matching by performance.

### 2.4.1. Alternate Models

The advantage of the model based on costly reorganization detailed above is that it can help explain both our patterns in a straightforward way. One model for two facts has its attractions. But the reality may well consist of two different models explaining the two different patterns. In this section I point out some of the models that could explain one or other of the empirical patterns.

Complementarity of productive assets would be an alternate assumption that will yield that productive assets be merged into larger firms. This would imply both that mergers are more prevalent among successful firms and that there is assortative matching among merger partners. What this model does not deliver is the fact that successful firms are not only more likely to merge, but are also more likely to do spinoffs.

The market response to merger announcements can also be explained with a couple of different models that do not imply assortative matching. One possibility involves a sharing model. Assume that mergers occur for exogenous reasons and that alternate mergers do not form good substitutes. A simple way to think of this is that two firms are picked at random and are arbitrarily ordered to merge or dissolve. The prices at which the transaction will occur will be the outcome of a bargaining process between the two firms, and will depend on their respective threat points. A greater price could be extracted from a more successful firm since it is likely to have more to lose. This would make the market reaction to a firm's stock increasing in the partner's performance and decreasing in its

own performance. A second possibility is that a merger is an endorsement by the merger partner, and that markets are more likely to trust the judgment of the managers of successful firms. So merging with a more successful firm is an endorsement by more trusted managers, and the market's response to the merger announcement will be more optimistic. While these models deliver the market announcement effect, what they don't deliver is the increased likelihood of mergers and spinoffs among more successful companies.

### 2.4.2. Matching on Performance vs. Matching on Industry

A claim in this paper is that firms match by performance and that this is not a spurious result of firms matching by underlying characteristics like the lines of business that they are in. The distinction has meaning even though the firm's performance is a function solely of its underlying characteristics, as long as there is more than one characteristic. If there is only one characteristic, say $X$, and performance is a strictly monotonic function of $X$, then $X$ is simply another measure of performance and there can be no distinction. But when there are multiple characteristics that can vary freely so that one can change these characteristics but keep performance the same, then the statement does have meaning. Matching by performance would imply that firms that have divergent characteristics but similar performances are more likely to merge than those that have divergent characteristics and divergent performances.

The reason why the assortative matching hypothesis is hard to test directly by checking the correlation of performances of merging firms is that it is impos-

sible to control for the characteristics of the merging firms. The claim that the test based on the market reaction to merger announcements solves this problem hinges on an assumption about what traders are reacting to. The assumption is that when firm A announces a merger with a successful firm B, traders are reacting to firm B's success itself and not just to the underlying characteristics. That is, the traders are not reasoning along the following lines: "Firm B is an environmentally friendly green firm (a good characteristic). Merger partners sort by characteristics. Therefore we now know that firm A is also a green firm. Green is a good characteristic, so I will be more optimistic about A and value it relatively higher than if it were merging with a firm that was not green." Instead, the assumption is that traders reason: "Firm B is successful. Merger partners sort by performance. So firm A must also be successful. So we will value A relatively higher than if it were merging with a less successful firm." This assumption about what the traders are reacting to is not testable, but it sounds reasonable to me that traders are reacting on the basis of the performances of merger partners, and not really to the underlying characteristics.

## 3. Empirical Results

*The Sample.* The sample is constructed using all U.S. public firms from 1963 to 2005 in the CRSP daily stock database. There are an average of 5,359 firms per month. Among these, there are 7576 instances of firms being acquired. This works out to a probability of being acquired of 0.29% per month, or 3.45% per

year. Of those acquired, I have acquirer information for 3380 firms, giving me 3380 mergers for which both acquirer and target information is available. I was able to obtain the announcement date for 975 of these mergers from Thomson's SDC Platinum database. There are 588 cases of firms engaging in a spinoff.

*Calculating Stock Returns and Excess Stock Returns.* Stock returns for firm $i$ in industry $j$ and month $t$ are calculated as

$$r_{ijt} = \ln\left[\frac{P_{ijt}}{P_{ij(t-1)}}\right]$$

The excess return is the excess over the equal weighted mean return for its industry and time:

$$r^e_{ijt} = r_{ijt} - \frac{1}{N_{jt}}\sum_{i=1}^{N_{jt}} r_{ijt}$$

where $N_{jt}$ is the number of firms in industry $j$ and month $t$. Industries consist of 49 Fama-French sectors as defined in Fama and French (1997).

### 3.1. Assortative Matching by Past Stock Performance Among Merger Partners

I first document sorting by past stock performance among merger partners. The sample consists of the 3380 mergers for which both acquirer and target information was available from CRSP. To mitigate spurious sorting due to industry and time effects, I use excess stock returns which, as described earlier, is the excess return over the average for the Fama-French industry and period. Naturally, it is also important in such an analysis to ensure that the market reaction to the merger

is not the common element in the past performance of both parties. That is, if the market reacts positively to a proposed merger, both partners' stock do well, and if they react negatively, both stocks do badly. To ensure that past stock performances are not affected by the market learning of an impending merger or spinoff, I use returns from a period that is likely to predate the merger becoming public knowledge. When the merger announcement month $s$ is available, past returns is the average for months $s-21$ to $s-2$. When the merger announcement month is not available, I use the average for months $t-24$ to $t-7$ where $t$ is the month the merger closed. In the subset of the sample for which announcement date was available, the announcement was made on average about 3 months before the merger close. So, going back 7 months before the merger close date in cases where the announcement date is not available should be a relatively conservative way to get returns untainted by news about the merger.

Among the subset of firms that merge, there is strong positive sorting by past excess stock returns, as documented in Table 1. Panel A gives summary statistics for past excess returns of merging firms. The correlation of acquirer and target past excess returns is 0.35. The mean excess return of acquirers was 1.4%, and that of targets was 0.9%. Panel B contains the evidence on the sorting by past performance. It reports that a regression of the acquirer's past returns on its target's past returns yields a coefficient of 0.31. So an increase in a target's past excess return by 1 percentage point increases the expected past excess returns of its acquirer by 0.31 percentage points. Conversely, a regression of target return on its acquirer's return shows that an increase in an acquirer's past excess return

by 1 percentage point increases the expected past excess returns of its target by 0.40 percentage points. Figure 2 plots the past excess stock returns of acquirers against those of their targets. The positive association is readily seen in the figure.

Clearly, it is imperative that industry be controlled for in the analysis. Merger partners are likely to be in the same industry due to operational reasons. So industry level shocks can drive the correlation between the stock returns of merger partners. The problem is only partly mitigated by the fact that I look at returns relative to the industry average, industries being classified into 49 Fama-French sectors. Even within an industry, no matter how narrowly the industry is defined, there are always going to be similar lines of businesses which receive common shocks. Regardless of how narrowly we define industries, there will always be some doubt over whether the similarity of the past stock performances of merger partners are driven by the similarity of the operational businesses that merger partners tend to be in, rather than the similarity of the stock performance driving the mergers. As discussed in the theory section, a more robust test for sorting can be performed using the market response to merger announcements. One can expect sorting to lead to a particular pattern in the market response to a merger announcement. If firms sort positively by performance and the firm's performance is not perfectly observed by the market, then the firm's choice of merger partners will reveal something about that firm's performance and will show up in the market response to the merger announcement. In particular, the market's response to the stock of a firm that announces a merger with a partner is increasing in its partner's past performance (since that is evidence that the firm itself is a good performer)

and decreasing in its own past performance (since that is evidence that the firm is not as good of a performer as expected).

To look at the market response to a merger announcement, I create a 7 working day window stretching from 3 working days before the announcement to 3 working days after, and calculate the firm's stock returns over this period. The sample consists of the 975 mergers from 1963 to 2005. These are the subset of CRSP mergers for which I was also able to collect information about announcement dates from Thomson's SDC Platinum database.

Panel A of table 2 shows summary statistics for the merger announcement. It documents the well known fact that acquirers lose a little on merger announcements while targets gain a lot [Andrade et. al (2001)]. In my sample, the acquirer stock lost an average of 2.3% and target stock gained an average of 16.8%. Interestingly enough, note that acquirer and target announcement responses have a correlation of 0.16, suggesting that there is a common announcement effect from the merger accruing to both partners. That is, mergers perceived as "good" raise both partners' stock while those perceived as "bad" damage both.

Panel B of table 2 contains the evidence for sorting by firm performance. It reports the results of a regression of the market response to a merger announcement by a firm on the past performance of its partner and its own past performance. The first regression controls for the sizes of the firms involved, whereas the second one does not. As predicted by the theory, the market response is increasing in the partner's past performance and decreasing in its own past performance. When firm size controls are included, the estimates imply that an increase in the part-

ner's past excess returns of 1 percentage point raises the announcing firm's stock by 0.73 percentage points. An increase in its own past returns by 1 percentage point decreases the announcing firm's stock by 0.85 percentage points. Panel C reports estimates for the same regression run separately for acquirers and targets. The magnitudes of the estimates are lower when the regressions are run separately, but the direction of the responses are maintained in both the acquirer and the target sample subsets.

There is a little bit of tension here with some of the results in Lang et. al. (1989) and Servaes (1991) who study takeover gains as a function of the Tobin's q of the acquirer and target. There is no inconsistency with their main result that the most valuable mergers, defined as the ones with the highest return to a value weighted portfolio consisting of the acquirer and the target, occur when high q firms take over low q firms. But their estimations with target or bidder gains as the dependent variable yield magnitudes that are sometimes inconsistent with the merger announcement effect documented in this section. It should be noted, however, that the problematic magnitudes in their regressions have relatively large standard errors and are not statistically distinguished from zero.

### 3.2. Past Stock Returns and the Probability of Being an Acquirer, Being a Target or Doing a Spinoff

This section shows that a firm's past stock return is positively associated with the probability of that firm redrawing its boundaries through acquiring, being acquired and doing spinoffs. I first relate the probability of a firm acquiring another firm

in a given month to its past stock returns. The probability of firm $i$ in industry $j$ and month $t$ acquiring another firm is

$$\pi_{ijt}^{acquirer} = f(r_{ijt}^{past})$$

where $r_{ijt}^{past}$ is the average stock returns for the firm $i$ over an 18 month period prior to $t$. To ensure that past stock performances are not tainted by the market learning of an impending merger or spinoff, as in the previous section, I use returns from a period that is likely to predate the merger becoming public knowledge. The measure used is the same as that used in the earlier analysis. When the merger announcement month $s$ is available, past returns is the average for months $s-21$ to $s-2$. When the merger announcement month is not available, I use the average for months $t-24$ to $t-7$ where $t$ is the month the merger closed.

Table 3 reports results from probit regressions of the choice of being an acquirer on a firm's past stock returns. The estimates in panel B show that an increase in past returns from 1 standard deviation below the mean (-.05) to 1 standard deviation above (+.05) increases the probability of a firm acquiring another firm by 91% (not percentage points). I also report estimates using past excess stock returns (i.e., returns relative to Fama-French industry and time) rather than past returns. In this instance, the increase in the probability of acquiring a firm is 83%. Figure 3 compares the probit probability estimates to the observed fraction of firms acquiring within groups defined by past returns.

Table 4 reports results from probit regressions of the event of being acquired

on a firm's past excess stock returns. The estimates in panel B show that an increase in past excess returns from 1 standard deviation below the mean to 1 standard deviation above increases the probability of a firm being acquired by another firm by 19%. When using past excess stock returns rather than past returns, the increase in the probability of acquiring a firm becomes 23%. Figure 4 plots the probit predicted probability of being acquired against the observed fraction of firms being acquired.

Table 5 reports results from probit regressions of the incidence of spinoffs on a firm's past excess stock returns. The estimates in panel B show that an increase in past excess returns from 1 standard deviation below the mean (-.04) to 1 standard deviation above (+.04) increases the probability of spinoffs by 37%. When using past excess stock returns rather than past returns, the increase in the probability of spinoffs becomes 33%. Figure 5 compares the probit probability estimates to the observed fraction of firms doing a spinoff within groups defined by past excess returns.

## 4. Conclusion

Somewhat contrary to the theme in both theoretical and empirical studies that highlight the contrast in financial characteristics between acquirers and their targets, I find evidence for assortative matching by past financial performance between acquirers and their targets. Successful firms tend to acquire successful targets. Testing whether firms sort by past performance presents some difficul-

ties. It is not enough to find a positive coefficient on a regression of an acquiring firm's stock returns on its target's stock returns. The correlation in the returns of merger partners could be driven by industry level shocks to the industry in which they operate. Controlling for industry and time period cannot satisfactorily solve the problem since industry classifications, however narrow, are always only crude measures of a firm's operations. There will always be the suspicion that unobserved (and therefore uncontrolled for) operational similarities between the merging firms is what drives the correlation in their returns. To solve this problem, I propose a novel test for sorting based on the market response to a firm's merger announcement. Under reasonable assumptions, sorting by performance will imply that the merger announcement contains news about a firm's performance. The market's reaction to a firm's stock over a merger announcement should be increasing in the past performance of its merger partner since that is evidence that the firm itself is of high productivity. Similarly, holding constant the performance of the merger partner, the announcement response should be decreasing in the firm's own past performance. This is because high levels of past performance by the firm is indication that the firm was being overvalued, in light of its choice of merger partner. I find both these effects in merger announcements, suggesting that there is indeed sorting by performance among merger partners and that the choice of merger partners provides information to the market about the merging firms' performance.

The assortative matching by past stock returns among merger partners, as well as the empirical pattern that successful firms are more likely to acquire,

be acquired and do a spinoff, can be explained in a model where redrawing the boundaries of firms is costly. If a reorganization of assets is expensive, then it will be an investment worthwhile making only for the more productive assets, which explains the increased deal activity of successful firms. Since the level of investment in a merger will depend on the productivity of the merger partners, the model also leads to sorting among merger partners.

Given that it can explain more than one empirical feature of mergers, I believe that a model featuring a nontrivial cost in the reorganization of firm boundaries should at least be a candidate for serious consideration. Whether further evidence weakens or supports this view will have to await future research.

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**Table 1: Assortative Matching By Past Stock Performance Among Merger Partners**
**U.S. Public Firms, 1963-2005**

This table shows sorting among merger partners by past stock performance in U.S. publicly listed firms: successful firms tend to acquire other successful firms. Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. To mitigate spurious sorting due to industry and time effects, past stock return is measured as the excess return over the average for the Fama-French industry and period. To ensure that past returns do not reflect reactions to merger announcements, I use a time period that is likely to precede the merger announcement. When the merger announcement month $s$ is available, past returns is the average for months $s$-21 to $s$-2. When the merger announcement month is not available, I use the average for months $t$-24 to $t$-7 where $t$ is the month the merger closed.

***A. Summary Statistics, Monthly Past Excess Returns of Merging Firms***

| | Mean | Std Dev |
|---|---|---|
| Past Monthly Excess Returns of Acquirers | 1.4% | 2.9% |
| Past Monthly Excess Returns of Targets | 0.9% | 3.3% |
| Correlation of Acquirer and Target Past Excess Returns | 0.35 | |

***B. Regression of Monthly Past Excess Returns of Merging Firms on that of their Partners***

| | (1) | | (2) | |
|---|---|---|---|---|
| *Dependent Variable:* | Acquirer Return | | Target Return | |
| Target Return | 0.31 *** | Acquirer Return | 0.40 *** | |
| | (.02) [a] | | (.02) | |
| *R-square* | 0.12 | | 0.12 | |
| *Observations* | 2475 | | 2475 | |

[a] parantheses contain standard errors of estimates.
*, **, *** refer to statistical significance at the 10%, 5% and 1% levels respectively.
*Source:* CRSP, SDC Platinum

**Table 2: Market Reaction to Merger Announcements: Role of Partner Quality**
**U.S. Public Firms, 1963-2005**

This table shows that the market response to a firm's merger announcement increases with the past stock performance of its partner, and decreases with its own past performance. Announcement response refers to stock returns over a 7 working day window stretching from $t$-3 to $t$+3 days where $t$ is the date of announcement. Past stock return is measured as the excess monthly return over equal-weighted averages for the Fama-French industry and period, and is the average for months $s$-21 to $s$-2, where $s$ is the announcement month. Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$.

***A. Summary Statistics: Market Reaction to Merger Announcements***
***Returns over the 7 working day window: announcement-3 days to announcement+3 days***

| | Mean | Std Dev |
|---|---|---|
| Acquirer Stock Return | -2.3% | 10.2% |
| Target Stock Return | 16.8% | 19.6% |
| | | |
| Correlation of Acquirer and Target Returns | 0.16 | |

***B. Regression of Market Response to Merger Announcements on Past Returns of the Merging Firms***

| | (1) | (2) |
|---|---|---|
| *Dependent Variable:* | Announcement Response | Announcement Response |
| Partner's Past Performance | 0.73 *** | 1.25 *** |
| | (.16) [a] | (.14) |
| Own Past Performance | -0.85 *** | -1.14 *** |
| | (.16) | (.14) |
| Ln Partner's Market Cap | 0.033 *** | |
| | (.003) | |
| Ln Own Market Cap | -0.025 *** | |
| | (.003) | |
| *R-square* | 0.23 | 0.07 |
| | | |
| *Observations* | 984 | 1358 |

***C. Regression of Market Response to Merger Announcements on Past Returns of the Merging Firms -- Separate Regressions for Acquirers and Targets***

| | (1) | (2) |
|---|---|---|
| *Dependent Variable:* | Response to Acquirer | Response to Target |
| Partner's Past Performance | 0.18 | 0.67 * |
| | (.14) | (.28) |
| Own Past Performance | -0.58 *** | -0.48 |
| | (.16) | (.26) |
| Ln Partner's Market Cap | -0.006 | 0.020 *** |
| | (.004) | (.006) |
| Ln Own Market Cap | 0.013 *** | -0.017 * |
| | (.003) | (.007) |
| *R-square* | 0.05 | 0.04 |
| *Observations* | 496 | 492 |

[a] parantheses contain standard errors of estimates.
*, **, *** refer to statistical significance at the 10%, 5% and 1% levels respectively.
*Source:* CRSP, SDC Platinum

**Table 3. Past Stock Returns and the Probability of Being an Acquirer, U.S. Public Firms**

Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. Excess returns refer to excess over the average for the Fama-French industry and month. To ensure that past returns do not reflect reactions to merger announcements, I use returns that are likely to precede merger announcements. For firms that are acquirers in month *t* and for whom the merger announcement month *s* is available, past returns for month *t* is the average return for months *s* -21 to *s* -2. When merger announcement month is not available for firms acquiring in month *t* , and for all firms not acquiring in month *t* , past returns is the average returns for months *t* -24 to *t* -7.

***A: Summary Statistics***

| | Monthly Prob of | Past Stock Returns | | Past Excess Stock Returns | |
|---|---|---|---|---|---|
| Decade | Acquiring | Mean | Std Dev | Mean | Std Dev |
| 1963-'72 | 0.0010 | 0.5% | 0.03 | -0.1% | 0.03 |
| 1973-'82 | 0.0007 | 0.1% | 0.04 | 0.0% | 0.03 |
| 1983-'92 | 0.0007 | -0.2% | 0.05 | 0.2% | 0.04 |
| 1993-'05 | 0.0019 | -0.1% | 0.05 | 0.4% | 0.05 |
| 1963-'05 | 0.0012 | 0.0% | 0.05 | 0.2% | 0.04 |

***B. Effect of Past Returns on the Probability of Being an Acquirer, Probit Estimates***

| | Using Past Stock Returns | | Using Past Excess Stock Returns | |
|---|---|---|---|---|
| Decade | Coeff | % Increase[a] | Coeff | % Increase[a] |
| 1963-'72 | 2.23 *** | 64% | 2.68 *** | 64% |
| | (.52) [b] | | (.61) | |
| 1973-'82 | 1.86 *** | 69% | 1.60 *** | 45% |
| | (.30) | | (.37) | |
| 1983-'92 | 1.95 *** | 85% | 1.94 *** | 75% |
| | (.24) | | (.26) | |
| 1993-'05 | 2.18 *** | 102% | 2.17 *** | 88% |
| | (.13) | | (.14) | |
| 1963-'05 | 2.14 *** | 91% | 2.24 *** | 83% |
| | (.11) | | (.11) | |

[a] "% increase" refers to the percentage increase in the probability of becoming an acquirer when past return increases from 1 standard deviation below the mean to 1 standard deviation above.
[b] parantheses contain standard errors of estimates.
*, **, *** refer to statistical significance at the 10%, 5% and 1% levels respectively.
*Source:* CRSP, SDC Platinum

**Table 4. Past Stock Returns and the Probability of Being Acquired, U.S. Public Firms**

Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. Excess returns refer to excess over the average for the Fama-French industry and month. To ensure that past returns do not reflect reactions to merger announcements, I use returns that are likely to precede merger announcements. For firms that are acquired in month *t* and for whom the merger announcement month *s* is available, past returns for month *t* is the average return for months *s* -21 to *s* -2. When merger announcement month is not available for firms being acquired in month *t* , and for all firms not being acquired in month *t* , past returns is the average returns for months *t* -24 to *t* -7.

***A: Summary Statistics***

| | Monthly Prob of Being | Past Stock Returns | | Past Excess Stock Returns | |
|---|---|---|---|---|---|
| Decade | Acquired | Mean | Std Dev | Mean | Std Dev |
| 1963-'72 | 0.0015 | 0.00 | 0.03 | 0.00 | 0.03 |
| 1973-'82 | 0.0020 | 0.00 | 0.04 | 0.00 | 0.03 |
| 1983-'92 | 0.0023 | 0.00 | 0.05 | 0.00 | 0.04 |
| 1993-'05 | 0.0037 | 0.00 | 0.05 | 0.00 | 0.05 |
| 1963-'05 | 0.0027 | 0.00 | 0.05 | 0.00 | 0.04 |

***B. Effect of Past Returns on the Probability of Being Acquired, Probit Estimates***

| | Using Past Stock Returns | | Using Past Excess Stock Returns | |
|---|---|---|---|---|
| Decade | Coeff | % Increase[a] | Coeff | % Increase[a] |
| 1963-'72 | 1.28 ** | 31% | 0.48 | 9% |
| | (.45) [b] | | (.57) | |
| 1973-'82 | 2.43 *** | 86% | 2.29 *** | 62% |
| | (.20) | | (.23) | |
| 1983-'92 | 0.82 *** | 26% | 1.20 *** | 36% |
| | (.17) | | (.18) | |
| 1993-'05 | 0.14 | 4% | 0.19 | 5% |
| | (.11) | | (.12) | |
| 1963-'05 | 0.62 *** | 19% | 0.84 *** | 23% |
| | (.08) | | (.09) | |

[a] "% increase" refers to the percentage increase in the probability of being acquired when past return increases from 1 standard deviation below the mean to 1 standard deviation above.
[b] parantheses contain standard errors of estimates.
*, **, *** refer to statistical significance at the 10%, 5% and 1% levels respectively.
*Source:* CRSP, SDC Platinum

**Table 5. Past Stock Returns and the Probability of doing a Spinoff, U.S. Public Firms**

Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. Excess returns refer to excess over the average for the Fama-French industry and month. To ensure that past returns do not reflect reactions to spinoff announcements, I use returns that are likely to precede spinoff announcements: past returns is the average returns for months *t* -24 to *t* -7.

***A: Summary Statistics***

| | Monthly Prob of | Past Stock Returns | | Past Excess Stock Returns | |
|---|---|---|---|---|---|
| Decade | Divesting | Mean | Std Dev | Mean | Std Dev |
| 1963-'72 | 0.0010 | 0.00 | 0.03 | 0.00 | 0.03 |
| 1973-'82 | 0.0007 | 0.00 | 0.04 | 0.00 | 0.03 |
| 1983-'92 | 0.0007 | 0.00 | 0.05 | 0.00 | 0.04 |
| 1993-'05 | 0.0019 | 0.00 | 0.05 | 0.00 | 0.05 |
| 1963-'05 | 0.0012 | 0.00 | 0.05 | 0.00 | 0.04 |

***B. Effect of Past Returns on the Probability of Doing a Spinoff, Probit Estimates***

| | Using Past Stock Returns | | Using Past Excess Stock Returns | |
|---|---|---|---|---|
| Decade | Coeff | % Increase[a] | Coeff | % Increase[a] |
| 1963-'72 | -0.20 | -5% | -2.09 | -36% |
| | (1.40) [b] | | (1.55) | |
| 1973-'82 | 2.18 *** | 95% | 2.12 *** | 71% |
| | (.42) | | (.47) | |
| 1983-'92 | 1.04 ** | 42% | 0.79 | 27% |
| | (.38) | | (.43) | |
| 1993-'05 | 0.22 | 9% | 0.54 | 20% |
| | (.38) | | (.42) | |
| 1963-'05 | 0.93 *** | 37% | 0.93 *** | 33% |
| | (.24) | | (.26) | |

[a] "% increase" refers to the percentage increase in the probability of doing a spinoff when past return increases from 1 standard deviation below the mean to 1 standard deviation above.
[b] parantheses contain standard errors of estimates.
*, **, *** refer to statistical significance at the 10%, 5% and 1% levels respectively.
*Source:* CRSP, SDC Platinum

***Figure 2: Past Excess Returns of Acquirers and Their Targets, 1963-2005***

This figure shows the correlation in past performance for merger partners among U.S. public companies. Excess return refers to excess over the average monthly return for the Fama-French industry and month, where returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. To ensure that past returns do not reflect reactions to merger announcements, I use returns that are likely to precede merger announcements. When the merger announcement month s is available, past returns is the average return for months s-21 to s-2. When merger announcement month is not available, past returns is the average returns for months t-24 to t-7. Return and merger data is from CRSP, and merger announcement date is from SDC Platinum.

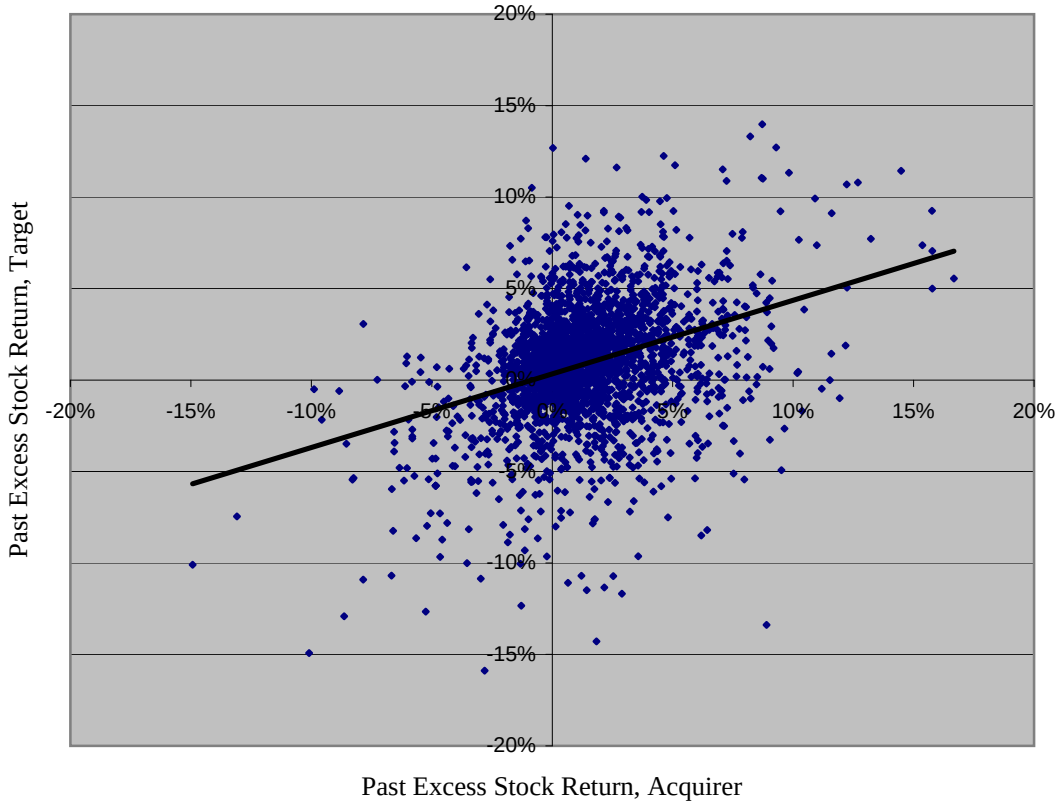

***Figure 3: Effect of Stock Market Performance on the Probability of Being an Acquirer, 1963-'05***

This figure shows the effect of past stock returns on the probability of acquiring in a given month for U.S. public companies. Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. To ensure that past returns do not reflect reactions to merger announcements, I use returns that are likely to precede merger announcements. For firms that are acquirers in month $t$ and for whom the merger announcement month $s$ is available, past returns for month $t$ is the average return for months $s$-21 to $s$-2. When merger announcement month is not available for firms acquiring in month $t$, and for all firms not acquiring in month $t$, past returns is the average returns for months $t$-24 to $t$-7. Return and merger data is from CRSP, and merger announcement date is from SDC Platinum.

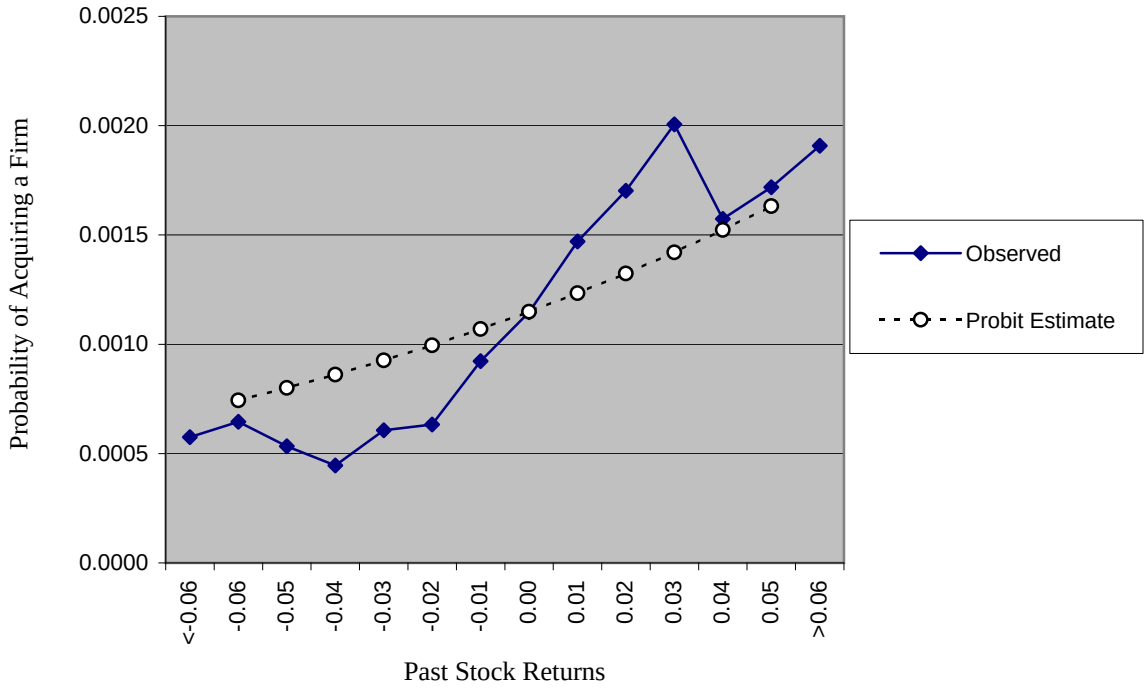

***Figure 4: Effect of Stock Market Performance on the Probability of Being Acquired, 1963-'05***

This figure shows the effect of past stock returns on the probability of being acquired in a given month for U.S. public companies. Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. To ensure that past returns do not reflect reactions to merger announcements, I use returns that are likely to precede merger announcements. For firms that are acquired in month $t$ and for whom the merger announcement month $s$ is available, past returns for month $t$ is the average return for months $s$-21 to $s$-2. When merger announcement month is not available for firms acquired in month $t$, and for all firms not acquired in month $t$, past returns is the average returns for months $t$-24 to $t$-7. Return and merger data is from CRSP, and merger announcement date is from SDC Platinum.

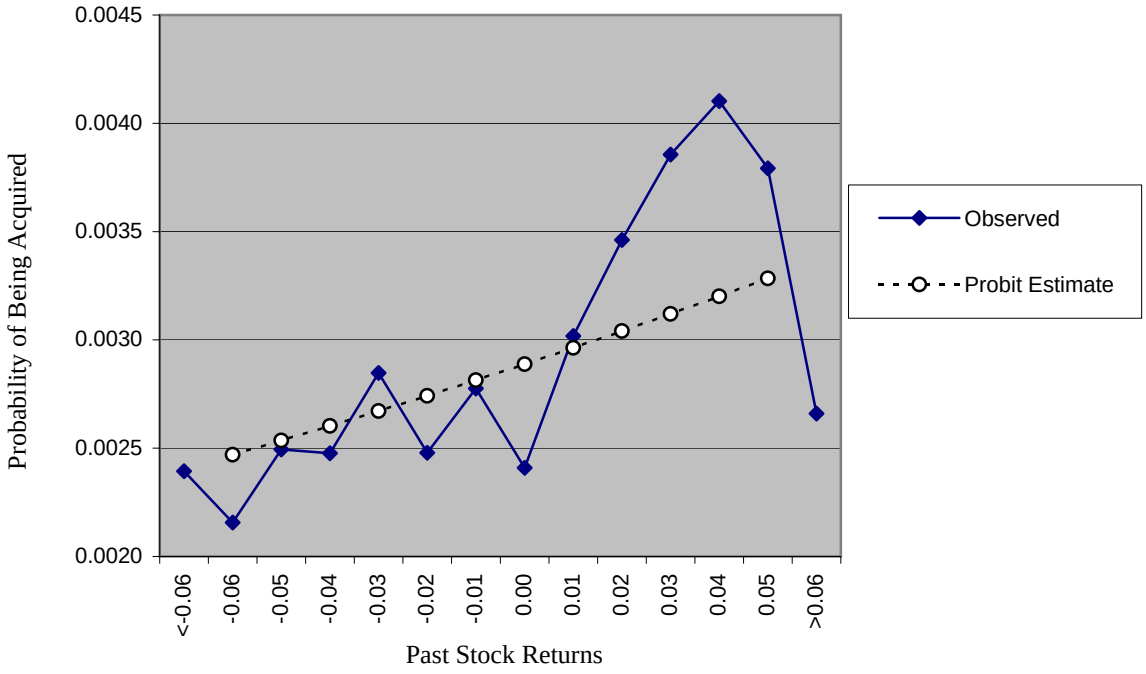

***Figure 5: Effect of Stock Market Performance on the Probability of Doing a Spinoff, 1963-'05***

This figure shows the effect of past stock returns on the probability of doing a spinoff in a given month for U.S. public companies. Returns refer to monthly stock returns, calculated as $\ln(P_t/P_{t-1})$. To ensure that past returns do not reflect reactions to spinoff announcements, I use returns that are likely to precede spinoff announcements: past returns is the average returns for months *t* -24 to *t* -7. Return and merger data is from CRSP, and merger announcement date is from SDC Platinum.