Acquisitions As Lotteries

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Abstract

This paper analyzes takeover announcements for public US targets from 1986 to 2008. Consistent with the hypothesis that gambling attitudes matter for takeover decisions, we find that the offer price premium is higher in acquisitions where the target's stock has characteristics similar to those of lottery tickets (high skewness, high volatility, and low price). We also find that in these lottery acquisitions both acquiror announcement returns and expected synergies from the deal are lower, while target returns are higher. The patterns we document are stronger in companies where managers are more entrenched, where the disciplining force of product market competition is lower, where recent acquiror performance has been poor, during economic downturns, and for acquirors headquartered in areas in which local gambling propensity is higher. Overall, our results suggest that corporate acquisitions are influenced by gambling attitudes.

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1. Introduction

A large body of evidence shows that Kahneman and Tversky's (1979) prospect theory, and its cumulative extension in Tversky and Kahneman (1992), describe individual choice behavior among risky alternatives well. How relevant prospect theory is for understanding large scale corporate decisions is still an important open question. Two main ingredients of the theory are reference dependence and probability weighting. Reference dependence refers to the tendency of decision makers to frame outcomes into gains and losses relative to a reference point. Consistent with reference points being relevant in the M&A context, Baker, Pan, and Wurgler (2009) show that the highest stock price of the target over the past 52 weeks serves as a powerful anchor for deal pricing. In this paper we provide empirical evidence consistent with the view that probability weighting – the second key ingredient of prospect theory – matters for the price paid in, and the market reaction to, corporate acquisitions.

Probability weighting captures the tendency of decision makers to put too much emphasis on small probability events and to underweight medium to large probabilities.[1] A growing literature in asset pricing studies its implications. Polkovnichenko (2005) demonstrates that cumulative prospect theory can explain quantitatively why some households choose to hold undiversified portfolios – they trade off loss of diversification for a small chance to capture large but unlikely gains. Barberis and Huang (2008) analyze the implications of probability weighting for security prices and show that idiosyncratic skewness can be priced in equilibrium even if all investors have identical cumulative prospect theory preferences. Consistent with the Barberis and Huang (2008) model, Boyer, Mitton, and Vorkink (2010) show that stocks with high expected idiosyncratic skewness earn lower returns, and Green and Hwang (2009) find that first day returns of IPOs can be at least partially attributed to an investor preference for skewness.[2]

[1] Probability weighting as a phenomenon has a long tradition in decision sciences. Seminal contributions are Allais (1953) and Kahneman and Tversky (1979). Experimental evidence has been collected in many studies including Tversky and Kahneman (1992), Wu and Gonzalez (1996), Gonzalez and Wu (1999), and Abdellaoui (2000). Prelec (1998) presents an axiomatic foundation for probability weighting. Tversky and Kahneman (2000) present a survey on numerous applications.

[2] Other frameworks that can explain a preference for idiosyncratic skewness are Brunnermeier and Parker

In this paper we provide evidence suggesting that probability weighting and, more generally, gambling attitudes have important implications also in the corporate context. Specifically, we focus on takeovers, which are among the largest and most significant investments made by corporations. We conjecture that managers of the acquiring company will overvalue small probabilities of large future returns from the target firm if they are subject to probability weighting. This tendency will be particularly pronounced for targets with a very skewed distribution of future returns. As a result, the acquiring firm overpays for targets that look like attractive bets. In a sufficiently efficient capital market, this would decrease announcement returns for the acquiror, and, all else equal, increase announcement returns for the target. Moreover, since managers subject to probability weighting perceive the upside return potential of the target to be higher than it actually is, synergies should, on average and all else equal, be lower in deals for which gambling attitudes matter. We develop a proxy for the attractiveness of a specific target firm as a gambling object and show that the above predictions are indeed borne out by the data.

Underlying this argument is the assumption that valuation models used to determine acquisition prices are sufficiently noisy for behavioral biases to matter (see also Baker, Pan, and Wurgler (2009)). While our paper is purely empirical, we have in mind a model where all CEOs are potentially biased but where the degree of bias and its impact on valuations are determined by the specific context in which the CEO operates. In particular, the degree with which managerial biases can enter valuations will be influenced by the level of managerial entrenchment and the competitive environment of the firm, both of which tighten or relax constraints on managerial discretion. In addition, the propensity to gamble (degree of probability weighting) of the decision makers might be influenced by macroeconomic conditions, and gambling attitudes of the local region in which the firm is located. Lastly, the propensity to gamble is likely to increase when the manager is in the loss space, which is a direct implication of the shape of the prospect theory value function. We test refinements of our main gambling hypothesis

(2005), Brunnermeier, Gollier, and Parker (2007), and Mitton and Vorkink (2007). Since these theories do not have an implication for reference points, they cannot jointly explain the findings in Baker, Pan, and Wurgler (2009) and the results we provide in this paper.

based on these conjectures and find strong confirmatory evidence.

We draw on the recent literature to construct an index which measures how much a target's stock resembles salient features of lottery tickets. Specifically, following a similar approach in Kumar (2009), the main variable we use to identify target firms as of lottery type, LIDX, is an index combining the expected idiosyncratic skewness, idiosyncratic volatility, and price features of the target's stock. Intuitively, the motivation for using these three features is that lottery tickets are usually cheap, their payoffs are risky (i.e. have a high variance), and, most importantly, they offer a small chance of a huge payoff (i.e. they have a high skewness). Theoretically, a preference for idiosyncratic skewness is a direct implication from the cumulative prospect theory model of Barberis and Huang (2008). High volatility will amplify the perception of skewness and the resulting speculative appeal of the stock (Baker and Wurgler (2007)).[3] Lastly, although the nominal price of one share should be largely irrelevant from the viewpoint of standard theory, recent research on stock splits suggests that there exists a common perception among investors and managers of what a "normal" range for the nominal price of a stock should be (Weld, Benartzi, Michaely, and Thaler (2010)). Target firms with stock prices below this norm are more likely to be perceived as cheap bets.

Our main findings are as follows. First, we find that after controlling for standard determinants of offer premia, the price paid in lottery acquisitions – acquisitions involving targets whose stock is more resemblant of salient features of lotteries – is significantly higher. A one standard deviation increase in the lottery index LIDX increases the offer price premium by 16.3%. The average market capitalization of targets is \$630.0 million, so a 16.3% higher premium represents an additional \$44.1 million in consideration paid to target shareholders for the average transaction. For all 4,618 completed deals in our sample this represents a total increase in the price paid to targets due to gambling attitudes of \$203 billion. Looking at the constituents of our index, we find that expected idiosyncratic skewness and idiosyncratic volatility are posi-

[3] As a practical matter, volatility and skewness are intimately linked. This can be the result from an actual functional relationship such as in the case of stock prices following a geometric Brownian motion. The link can also be due to how individuals evaluate the attractiveness of gambles. The behavioral tendency to disregard a high return from a high skewness stock as an outlier if high returns are observed only rarely, i.e. if the variance is low, suggests that both variance and skewness are important.

tively related, and the price is negatively related to the offer price premium. Second, we find that announcement returns for acquirors are 47.3% lower, and target announcement returns are about 13.3% higher when LIDX changes by one standard deviation. For the average deal, the additional loss to bidders due to gambling attitudes in the three days around the announcement is $65.6 million. Third, expected synergies are on average lower in lottery acquisitions; a one standard deviation shift in LIDX decreases expected synergies from the deal by about 36.4%. We show that these patterns are robust across a large set of alternative regression specifications.

We also test more refined aspects of our gambling hypotheses. Specifically, we find that the negative relation between acquiror announcement returns and synergies and the LIDX index is stronger for acquiror firms in which managers are either more likely to gamble, or in which constraints on managerial discretion are weaker. In these tests we proxy for managerial discretion by using the governance index of Gompers, Ishii, and Metrick (2003), and by using the measure of product market competition suggested in Giroud and Mueller (2010). We also find that the proxy for gambling propensity suggested by Kumar, Page, and Spalt (2009), the ratio of Catholics to Protestants in the county population where the firm is headquartered, is strongly related to our effects: the lottery features of the target influence acquiror returns and synergies more if the proxy suggests a higher gambling propensity for the managers of the firm. Moreover, our effects are stronger during economic downturns, when the prospect of winning a large jackpot is likely to appear more attractive (Mikesell (1994), Kumar (2009)). Lastly, we establish that the relation between acquiror returns, synergies and LIDX is stronger for companies which have experienced poor performance in the recent past (low returns, large difference of stock price to 52 week high, low Z-Score, negative earnings at prior fiscal year end) which is consistent with the prospect theory prediction of increased gambling appetite in the loss space. Overall, these findings, which are hard to reconcile with alternative explanations, lend strong support to our main gambling hypothesis.

There is a growing literature showing that speculation and gambling preferences of individuals influence their stock market investments (e.g. Dorn and Sengmueller (2009), Kumar (2009), Brav, Brandt, Graham, and Kumar (2010)). Motivated by this work, and motivated by Roll's (1986) observation that "takeovers reflect individual decisions", our main conjecture in this paper is that gambling preferences are not only relevant for small investors, but also for managerial decisions in the corporate context. We argue that this conjecture is plausible. First, prior research shows clearly that biases are not in general less relevant for professionals (e.g. Coval and Shumway (2005), Haigh and List (2005)). Second, van de Kuilen and Wakker (2006) provide evidence that probability weighting is only attenuated for decisions that are very frequent and that provide fast and informative feedback. For the vast majority of firms, large scale corporate acquisitions do not share these characteristics.[4] Third, although M&A decisions are usually taken in teams and using external consultants, there is no guarantee that inflated expectations about project success are corrected in groups (Kahneman and Lovallo (1993)). Lastly, although on average biased managers make worse decisions, managers who make it to the top position in their firm might often be those that were lucky in previous rounds of gambling.

Our paper contributes both to the vast literature on mergers and acquisitions, and the small subset of the M&A literature analyzing the influence of biased managers.[5] Roll (1986) proposes that managerial overconfidence ("hubris") leads to overpayment and explains why acquiror shareholders loose money on average. Following Roll (1986), overconfidence has been the most widely studied alternative to more standard explanations of M&A activity (e.g. Hietala, Kaplan, and Robinson (2003), Moeller, Schlingemann, and Stulz (2004), Malmendier and Tate (2008)). We share with these papers the general approach of analyzing biased managers in rational markets. However, the effects we document are not driven by overconfidence. Our explanation based on gambling attitudes and probability weighting is new to the literature. As we control for the standard variables in similar studies, our results add novel, and economically important, effects to well-established drivers of premia and returns (e.g. Andrade, Mitchell, and Stafford

[4]In fact, one of the features of acquisitions where our lottery ticket metaphor is least accurate is their low frequency.

[5]The literature on mergers and acquisitions is much too voluminous for us to review here. Excellent overviews of major themes can be found for example in Andrade, Mitchell, and Stafford (2001) or Betton, Eckbo, and Thorburn (2008). See Baker, Ruback, and Wurgler (2008) for a survey of behavioral corporate finance in general, and the M&A literature with biased managers in particular.

(2001)).

Conceptually, our paper is most closely related to the study of Baker, Pan, and Wurgler (2009). These authors show that reference points matter for offer price premia and acquiror announcement returns. We document a role for gambling attitudes. Reference points and gambling attitudes, modeled by probability weighting, are the key building blocks of prospect theory. Hence, while it is clear that no theory will ever be able to singlehandedly explain all complexities of M&A transactions, our empirical results suggest at the very least that prospect theory should be put on the list of possible explanations for observed M&A phenomena.

We develop our hypotheses in Section 2. Section 3 presents the dataset used. The impact of target lottery characteristics on offer price premia, synergies, and announcement returns is analyzed in Section 4. Section 5 tests some finer predictions of our gambling hypothesis. Section 6 concludes.

2. Hypotheses

Our main conjecture in this paper is that probability weighting induces a preference for target firms that look like attractive gambling opportunities. This has several testable implications for lottery acquisitions, which we define as acquisitions involving targets whose stock is more resemblant of salient features of lotteries. We describe these implications in the following and test them in the next sections.

The first set of hypothesis addresses the relation between lottery acquisitions and offer price premia, announcement returns, and synergies. In a given acquisition, the offer price premium (the premium paid for the target's stock relative to its pre-announcement value) depends on both the stand-alone valuation of the target and the expected synergies from the deal. Managers subject to probability weighting will overvalue targets that look like attractive bets, and thus be willing, all else equal, to pay a higher premium in lottery acquisitions.[6] Alternatively, they

[6]This reasoning goes through also if we assume that target managers themselves are biased. In this case, they are not willing to sell the firm at the true price, which will tend to exacerbate the effect that the offer price premium will be higher in lottery acquisitions. We assume that the bargaining power between bidder and

might be willing to acquire a lottery type target for the same price than an otherwise identical non-lottery type target even if it has a lower expected level of synergies than the latter. Hence, our first two hypotheses are:

> **H1 (Offer price premium):** The offer price premium is higher if the target is an attractive gambling object, i.e. if the target's stock more closely resembles salient characteristics of lotteries.

> **H2 (Synergies):** Synergies are lower in lottery acquisitions.

We assume that the market is rational. Hence, the announcement return of the acquiror will be lower in lottery acquisitions because the market recognizes the overpayment.

> **H3 (CARs):** Announcement returns for the acquiror are lower in lottery acquisitions.

While the prediction for bidder announcement returns are unambiguous, note that there are two offsetting effects for target announcement returns. Target announcement returns might be higher, because, for a given level of synergies, overpayment is a pure wealth transfer to target shareholders. However, on average smaller synergies for lottery acquisitions will, all else equal, decrease target announcement returns in these deals, since the cake that can be split between bidder and target is smaller. If target announcement returns are higher or lower in lottery acquisitions is thus an empirical question.

The next set of hypotheses focuses on more unique implications of our main gambling conjecture. Kumar, Page, and Spalt (2009) propose a proxy for gambling propensity based on geographical dispersion in religious beliefs across counties in the US. These authors argue that local attitudes towards gambling influence the gambling propensity of individuals operating in this environment. Higher gambling propensity can be directly translated into a probability weighting function that overweights small probabilities more (e.g. Tversky and Kahneman

target is independent of the lottery characteristics of the target.

(1992)). We use the proxy proposed in Kumar, Page, and Spalt (2009) to test the following hypothesis:

> **H4a (Gambling propensity – Local culture):** The effects of the lottery characteristics of targets on the offer price premium, announcement returns and synergies should be more pronounced for firms located in a region where the local population is more likely to find gambling attractive.

This provides a relatively clean test of our gambling hypothesis, and allows us to distinguish our conjecture from a number of potential alternatives. For example, while it is conceivable that lottery targets are harder to value and therefore likely to attract offers that are too high (the "winner's curse"), it is not obvious why firms should be harder to value just because they are located in Catholic regions.

A related hypothesis builds on evidence suggesting that betting on long shots becomes more attractive during economic downturns. Evidence for this has been provided in the context of state-lotteries (e.g. Brenner and Brenner (1990) and Mikesell (1994)) and in the context of retail investor behavior, who invest more in lottery type stocks in bad economic conditions (Kumar (2009)). In our context, because economic downturns put a limit on growth opportunities available through standard economic activity, gambling in acquisitions is likely to become relatively more attractive.

> **H4b (Gambling propensity – Economic downturns):** The effects of the lottery characteristics of targets on the offer price premium, announcement returns and synergies should be more pronounced during economic downturns.

Gambling propensity will be constrained by the firm environment in which the managers operate. In particular, managers who have more discretion because they are shielded from competitive forces will be more likely to make value destroying acquisitions. The first determinant of managerial discretion we have in mind is managerial entrenchment as measured in the well-known governance index of Gompers, Ishii, and Metrick (2003). The second determinant of managerial discretion is product market competition (e.g. Giroud and Mueller (2010)). The fiercer the product market competition, the more costly is every dollar lost on a bad acquisition. Moreover, firms that can successfully compete in very competitive environments are more likely to have good financial checks and balances in place.

> **H5 (Managerial discretion):** The effects of the lottery characteristics of targets on the offer price premium, announcement returns and synergies should be more pronounced for firms in which the management is more entrenched and in industries where product market competition is low.

Our last hypothesis draws on additional implications from prospect theory. In particular, Kahneman and Tversky (1979) show that the willingness to gamble increases strongly if the alternative is a sure loss. This is reflected in the convexity of the value function over the loss space. We hypothesize that gambling in the loss space is also relevant for the takeover effects we document. If a firm has recently underperformed (e.g. low stock returns in the recent past, large difference to 52 week high, or negative net income last year), or is closer to bankruptcy, managers might perceive themselves to be in the loss space, which would increase their willingness to bet on a long-shot ("gambling for resurrection").[7]

> **H6 (Gambling in the loss space):** The effects of the lottery characteristics of targets on the offer price premium, announcement returns and synergies should be more pronounced for firms which have recently underperformed.

[7] Thaler and Johnson (1990) show that there exist situations where prior losses exacerbate risk aversion, and where prior gains lead to increased risk seeking (the "house money effect"). However, this behavior is unlikely to be observed in our specific context for two reasons. First, as stressed by Thaler and Johnson (1990) themselves: *"If prior losses were facilely integrated with subsequent outcomes, we would expect decision makers to be risk seeking for complex losses, just as they are for simple prospects involving losses."* In our setting, the acquisition of another company integrates prior losses and the gamble mechanically via the bidder's stock price and via other performance measures of the combined firm. It is unlikely that a CEO would make an acquisition without thinking about its impact on the stock price, or other performance measures, so integration is very plausible in our setting. Moreover, Thaler and Johnson (1990) provide evidence showing that gambling in the loss space will be more attractive if there is a chance to leave the loss space or break even, which would apply at least partly to most of the large transactions we look at. Our predictions here are thus in line with Thaler and Johnson (1990).

This last hypothesis provides additional evidence that our results are not due to overconfidence, since it is unclear why managers who have recently experienced bad corporate performance would be more optimistic and confident in their own abilities.

3. Data

3.1 Construction of the dataset

Our initial sample consists of all takeover bids involving public US targets and US acquirors listed in the Thomson Reuters SDC database from January 1, 1986 to December 31, 2008. Following Baker, Pan, and Wurgler (2009) we require that the bidder offers to purchase at least 85% of the target firm shares or that the portion of shares acquired is not reported. After excluding deals with missing offer price, deals with a deal value smaller than $1 million, repurchases, recapitalizations, rumored and target solicited deals 8,588 offers remain. We are able to compute our lottery index, described in detail below, for 6,187 of these firms. We obtain stock price data from CRSP and balance sheet data from Compustat for both acquiror and target firms. Table 1 shows our final sample.

The dependent variables we use are standard. The offer price premium is reported by SDC and defined as the difference between the price per share of the target paid and the price 4 weeks prior to the deal announcement divided by the price 4 weeks prior to the deal announcement. We calculate acquiror and target cumulative abnormal returns over a three day window around the announcement using market model estimates based on daily data estimated over days [-230;-31]. Synergies are estimated following the procedure in Bradley, Desai, and Kim (1988) as a weighted average (by market capitalization) of target and bidder percentage returns.

The main explanatory variable we use is the lottery index LIDX, which measures how much a target stock shares salient characteristics of lottery tickets. To construct LIDX, we need measures of price, volatility, and skewness. We use the method of Boyer, Mitton, and Vorkink (2010) to estimate expected idiosyncratic skewness (EISKEW), i.e. to identify targets that have the potential to generate large future payoffs.[8] Boyer, Mitton, and Vorkink (2010) show that past skewness is a weak predictor of future skewness and propose an cross-sectional estimation procedure instead.[9] To estimate EISKEW, we first run for each month the regression

$$is_{i,t} = \beta_{0,t} + \beta_{1,t} is_{i,t-T} + \lambda_t' \mathbf{X}_{i,t-T} + \epsilon_{i,t} \tag{1}$$

on the whole universe of CRSP firms. Here, $is_{i,t}$ is idiosyncratic skewness of stock i at the end of month t, $is_{i,t-T}$ is idiosyncratic skewness at the end of month $t-T$, and $\mathbf{X}_{i,t-T}$ is a vector of additional firm-specific variables observable at the end of month $t-T$. Firm-specific variables include idiosyncratic volatility, momentum, turnover, and a set of dummy variables for firm size (small, medium, large), industry (based on 2-digit SIC codes), and NASDAQ stocks. In the spirit of computing expected returns in a standard event study, we then use the coefficients from this regression to estimate expected idiosyncratic skewness at the end of month $t+T$ as:

$$EISKEW \equiv E_t[is_{i,t+T}] = \beta_{0,t} + \beta_{1,t} is_{i,t} + \lambda_t' \mathbf{X}_{i,t}. \tag{2}$$

The choice of the forecast horizon T is ultimately subjective. As a baseline case we use $T = 36$, which implies that managers have a three year timeframe in mind when evaluating a potential acquisition target.[10] Since the turnover variable for NASDAQ stocks is only reported on a widespread basis from January 1983, this procedure determines the start date of our sample period as January 1986. The second lottery feature in LIDX is idiosyncratic volatility (IVOLA), measured as the regression residual from a Fama and French (1993) three-factor model, estimated using daily data over a three year period.[11] We use a three year horizon to

[8]Although total skewness could also be attractive to individuals with high gambling propensity, we focus on idiosyncratic skewness to align our work with the predictions from the Barberis and Huang (2008) model, and to distinguish our results from the well-known effects of coskewness (e.g. Kraus and Litzenberger (1976), Harvey and Siddique (2000)). We use idiosyncraic volatility instead of total, or systematic, volatility for analogous reasons.

[9]See Boyer, Mitton, and Vorkink (2010) for additional details on the estimation procedure.

[10]In the robustness checks we show that our results are not very sensitive to this horizon and that any T between 12 and 60 months produces similar results.

[11]We obtain the Fama-French factors from Kenneth French's website: `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`.

match the estimation of EISKEW. Lastly, we obtain the stock price at the end of month t from CRSP.

To construct LIDX, each month we independently sort all CRSP stocks with sharecodes 10 or 11 into 20 bins for each of the lottery features (expected idiosyncratic skewness, idiosyncratic volatility, and price), such that higher bin numbers indicate greater attractiveness as a gambling object. For example, a stock with very low price, and very high skewness and volatility would be in bin 20 for price, skewness, and volatility, respectively. We then form LIDX by adding the three individual scores. Finally, we rescale LIDX such that it lies between 0 (least attractive as a gamble) to 1 (most attractive as a gamble). Having obtained a value for the lottery index, we then assign the value of LIDX at the end of month $t - 2$ to a target firm with announcement date in month t. We use lagged values here, and in all other explanatory variables to make sure information leakage and other contemporaneous effects are not contaminating our results. We label a target with a high value of LIDX a lottery type target and we call a transaction involving a lottery type target a lottery acquisition. Table 1 shows that the fraction of lottery acquisitions is overall fairly stable across years.

In addition to our main variable LIDX, we control for standard variables identified in the literature in all our regressions. In particular, following Baker, Pan, and Wurgler (2009), we control for the return on assets, defined as net income (Compustat:NI) over total assets (Compustat:AT), market capitalization, defined as price (CRSP:PRC) times shares outstanding (CRSP:SHROUT), and the book to market ratio, defined as book equity divided by market capitalization, where book equity is total shareholders' equity (Compustat:SEQ) plus deferred taxes and investment tax credit (Compustat: TXDITC) minus the redemption value of preferred stock (Compustat: PSRKRV). All these variables are calculated for acquirors and targets, and are based on the last fiscal year end before the announcement. Following Moeller, Schlingemann, and Stulz (2004) we include additional control variables. First, we obtain a set of deal characteristics from SDC, including dummy variables indicating payment through stock only or cash only, tender offers, hostile takeovers, conglomerate mergers (mergers in which the bidder is in a different 2 digit SIC code industry than the target), and competed deals (with more than one bidder). We also include the relative size of bidder and target, a dummy variable indicating new economy firms (classified by SIC codes 3570 to 3579, 3661, 3674, 5045, 5961, or 7370 to 7379 as in Oyer and Schaefer (2004)), and the number of transactions in the same 2-digit SIC industry and year, to control for periods of heightened M&A activity in all our regressions. We winsorize all variables at the 1% and 99% level. (We show in the robustness section that our main results do not change when we use unwinsorized data.)

In some of our tests we use religious affiliation data obtained from the "Churches and Church Membership" files from the American Religion Data Archive (ARDA), the aggregate market-level sentiment index data from Jeffrey Wurgler's website, the GIM-index data from Andrew Metrick's website, and the Chicago Fed national activity index (CFNAI).[12] We provide an overview of all variables used in our analysis and their definitions in the Appendix.

3.2 Summary statistics

Table 2 presents summary statistics for the main variables we use. We report means, medians, the standard deviation, and several percentiles of interest. We also report the number of observations for each variable, which varies due to data availability. The median offer price premium is 35.3%. Median cumulative abnormal announcement returns for bidders from day -1 to day +1 is -1.1%. The median target announcement return is 16.2%. Synergies, the combined change of bidder and target returns, are 1.0%, so offers are on average expected to create value.

The median acquiror has a market capitalization of $bn 1.3, a book to market ratio of 0.47, and a return on assets of 3.2%. The median target has a market capitalization of $106.0 million. Since we are looking only at public targets, these are on average sizeable firms. For the median offer, the proposed deal value is 24.1% of the market capitalization of the acquiror, which illustrates that these transactions are important financial decisions for acquirors. With 0.64, the median book to market ratio of targets is larger than the book to market ratio of

[12] These data can be found at www.thearda.com, pages.stern.nyu.edu/~jwurgler/, www.som.yale.edu/faculty/am859/, and www.chicagofed.org.

acquirors. The performance of targets in terms of return on assets is 1.5% and thus consistent with the idea, that, on average, underperforming firms are more likely to become targets. 15.9% of targets are new economy firms (SIC codes 3570 to 3579, 3661, 3674, 5045, 5961, or 7370 to 7379).

Looking at deal characteristics, Table 2 shows that 41% of the bids offer cash only, while 28% of bids involve pure acquiror stock considerations. 20% of the offers in our sample are tender offers, and 1.8% of bids are classified by SDC as hostile. For a large fraction of offers, 47%, the bidder is in a different 2-digit SIC code industry as the target. Multiple bidders are present in 11% of cases and 75% of the offers in our sample lead to successfully completed deals.

4. Empirical Results

This section presents our main results. We largely follow the prior literature in the regressions we run and the control variables we use. Specifically, we regress the offer price premium, synergies, and announcement returns on our lottery measures, a set of acquiror and target characteristics suggested by Baker, Pan, and Wurgler (2009) and a set of deal characteristics suggested by Moeller, Schlingemann, and Stulz (2004). We also include a dummy variable indicating new economy firms (classified by SIC code as in Oyer and Schaefer (2004)), and the number of transactions in the same 2-digit SIC industry and year, to control for periods of heightened M&A activity. We run OLS regressions and cluster standard errors in all regressions by announcement month.

Our main lottery variable is the LIDX index, where a higher index value indicates closer resemblance to lottery tickets. Although we do not expect any single measure to capture the attractiveness of a target as a gamble as well as LIDX, for completeness we present also the results for using the components of the index, expected idiosyncratic skewness, idiosyncratic volatility, and price of the target's stock prior to the announcement.

4.1 Offer price premia

We hypothesize that the offer price premium would be higher in lottery acquisitions (Hypothesis 1). We find strong support for this hypothesis when we regress the offer price premium on the lottery index LIDX (Table 3). We also find that the individual components are related to the offer price premium as expected: higher skewness and volatility increase the offer price premium, while higher price decreases it. All coefficients are highly statistically significant. They are also economically significant. A one standard deviation change in LIDX increases the offer price premium by 16.3% (= $0.25 \times 27.9/42.9$). The average market capitalization of targets is \$630.0 million, so a 16.3% higher premium represents an additional \$44.1 million (=\$m 630 $\times$ 16.3% $\times$ 42.9%) in consideration paid to target shareholders for the average transaction. For all 4,618 completed deals this represents a total increase in the price paid to targets due to gambling attitudes of \$203 billion. Hence, the effects we document are large.

The signs and significance of our control variables are consistent with those reported in other studies. In particular, we find that larger acquirors pay more, which is consistent with the finding of Moeller, Schlingemann, and Stulz (2004) that smaller acquirors make better acquisitions. Among deal characteristics, we find that offer price premia are higher in tender offers, hostile bids, and in deals with multiple bidders. Lastly, we find that offer price premia are higher for new economy firms.

4.2 Synergies

Our second hypothesis is that on average synergies would be lower in lottery acquisitions. Again, our empirical results are consistent with this hypothesis (Table 4). Following Bradley, Desai, and Kim (1988), we measure synergies as the sum of target and acquiror three day announcement returns weighted by the market capitalizations of the target and acquiror, respectively. Table 3 shows that synergies are decreasing in LIDX. A one standard deviation change in LIDX leads to synergies that are on average 56 basis points lower (= 0.25×2.23). Relative to the mean percentage synergies of 1.54%, this represents a 36.4% decrease. Looking at the components of LIDX, we find, as conjectured, lower synergies for high skewness and high volatility targets, and lower synergies if the target share price is low. Overall, these results provide strong support for Hypothesis 2.

4.3 Announcement returns for acquiror and target

If lottery acquisitions have lower synergies and higher offer price premia, then we expect negative acquiror returns around the announcement date (Hypothesis 3). Table 5, Panel A presents results consistent with this hypothesis. When we regress three day announcement returns for the acquiring firm on LIDX, we find that a one standard deviation increase in LIDX decreases the announcement return of the acquiror by 79 basis points (= 0.25×3.16), which is 47.3% relative to the mean announcement return of -1.67%. The mean size of the acquiror in our sample is \$8.3 billion, so this would translate into an additional loss due to gambling attitudes of \$65.6 million (= \$bn $8.3 \times 47.3\% \times 1.67\%$) in acquiror firm value around the announcement due to gambling behavior. Also in this setting, the individual components of the index are significant and have the expected sign, providing further evidence to support our hypothesis that gambling attitudes influence acquisition decisions.

Because the the effects of LIDX on offer price premia and synergies have opposite effects on target returns, we do not have a clear prediction for the announcement returns of target firms. For completeness, Panel B of Table 5 presents results for targets. Three day announcement returns are positively related to the lottery index, and its constituents, high skewness and high volatility, and negatively to the price of the target. A one standard deviation change in LIDX increases target announcement returns by 13.3% (= $10.9 \times 0.25 / 20.5$), or about \$17.2 million (= \$m $630 \times 13.3\% \times 20.5\%$). This is consistent with acquirors overpaying sufficiently for targets that look like lottery tickets to compensate for the smaller gains from synergies.

4.4 Robustness checks

So far, our results provide strong evidence suggesting that gambling attitudes influence deal pricing in lottery acquisitions. In this section we present a battery of robustness checks for our regressions with offer price premium, synergies, and announcement returns as dependent variables. For conciseness, we show the results for our main index, LIDX, only. The main results from columns 5 in Tables 3, 4, and 5, are shown at the top of each panel as "baseline."

Table 6, Panel A demonstrates that our results are robust to using alternative time periods to estimate key variables. First, we vary the horizon over which we estimate the expected idiosyncratic skewness with the Boyer, Mitton, and Vorkink (2010) method. Our baseline is three years. For robustness, we show results for one, two, four, and five year estimation periods. Our results are essentially unaffected by the horizon we choose. Next, we vary the event window we use to calculate cumulative abnormal announcement returns. Again, our main results are not sensitive to using either three, five, seven, or eleven day windows.

In Table 6, Panel B, we run our regressions on a number of subsamples. First, we divide our sample into large and small acquirors since there are known differences in the acquisition success between large and small firms (Moeller, Schlingemann, and Stulz (2004)). We also split our sample into large and small targets to investigate if our results are driven by a particular subsample of targets. As can be seen from Table 6, Panel B, the lottery acquisition affect is present in all subsamples. We also use the sentiment index of Baker and Wurgler (2006) to see if our regressions are picking up effects related to sentiment, i.e. market effects, rather than effects from managerial preferences. We find that the offer price premium for lottery acquisitions is higher in high sentiment periods, while synergies and bidder announcement returns are lower in low sentiment periods. Target announcement returns are lower in high sentiment periods. We conclude from the sentiment sample split, and the fact that our main predictions regarding the offer price premium, synergies and acquiror announcement returns are present in both subsamples, that we are picking up effects unrelated to sentiment. In our last set of results we split our sample into three subperiods. We find that our effects are stronger in the later part of the sample. They have thus become even more relevant recently.

In Table 6, Panel C we use alternative setups to estimate our main regressions. We first include a set of year dummies, which makes our results even stronger than in the base case. Next, we include both year and industry dummies (2-digit SIC codes), and find that this does not materially affect size and significance of our coefficients relative to the base case. An exception is our results for synergies, which become noticeably stronger with year and industry dummies. Next, we include leverage and operating cash flow in our baseline regression. We exclude banks and financial firms (1-digit SIC code of 6) in this test and find that the results are robust to including these additional controls. Next, we use the Amihud (2002) liquidity measure to control for potential differences in liquidity between lottery and non-lottery targets. Our results are not changed by the inclusion of this variable. We include the CAPM beta and coskewness, as measured in Harvey and Siddique (2000), to show that our results are indeed capturing idiosyncratic volatility and idiosyncratic skewness, which should not matter in more traditional economic models, rather than their systematic counterparts. Our results are robust to controlling for these variables. Lastly, we include the Z-Score (Altman (1968)), a measure of default risk, among our control variables. There might be rational incentives for manager to gamble in distressed firms, or in firms closer to bankruptcy. Our results show that this is not what we are capturing in our lottery index.

In a further test, we show that our results are not driven by the fact that we include both completed and non-completed deals. All inferences go through when we only use the subsample of completed deals. One conjecture about our results could be that they are driven largely by new economy stocks. While we already control for those stocks using a new economy dummy in our basline regressions, we show here that the results are also very strong in the subsample of firms that do not belong to the new economy. We find that our results continue to hold, and get even slightly stronger, when we exclude transactions with a deal size smaller than 1% of the bidder market capitalization. Another concern could be that our measure pics up stocks with very small prices, such as penny stocks and that these stocks drive our inferences. We observe that our results are robust to excluding all stocks with a stock price below $5 dollars, although we are then effectively throwing away many of the stocks which should be most attractive as a gamble. We winsorize all variables in our baseline regressions. To rule out that this affects our results, we reestimate median regressions as a alternative way to deal with outliers. We also report results without any winsorization. None of our results are materially affected. Finally, as an alternative to using percentage announcement returns, we compute dollar announcement returns and dollar synergies in a further test. The economic significance of our results is slightly larger in these tests than in our base estimates. In particular, a one standard deviation change in LIDX leads to a dollar value change in synergies of $26.5 million. The more noisy dollar values lead to a drop in the t-statistic on synergies to 1.29, but results continue to be highly significant for both bidder and target announcement returns.

Overall we conclude that our main results are robust to a large number of checks and are unlikely to be driven by the estimation periods used for our main variables, or the specification of our main regressions.

5. Additional Empirical Evidence: Determinants and Constraints of Managerial Gambling Attitudes

In the previous section we have established that offer price premia are higher, and both synergies and bidder announcement returns are lower in lottery acquisitions. In this section we test finer predictions of our hypothesis that managerial preferences are influencing M&A pricing and provide additional evidence that gambling attitudes, as modeled by prospect theory, are driving our results. Our strategy is to show (i) that measures of gambling propensity among managers are related to our effects, (ii) that our effects are strongest in firms in which managers are entrenched, and can thus potentially have a greater influence on deal pricing, and (iii) that our effects are strongest in situations where prospect theory predicts gambling appetite to be highest. In this section we estimate for various subsamples the same regressions as we did in columns 5 in Tables 3, 4, and 5. For conciseness, we show only the coefficient on the lottery index LIDX and suppress the coefficients of the control variables.

5.1 Gambling propensity

We start by analyzing the impact of a direct proxy of the managerial propensity to gamble. Because of obvious data constraints, direct measures of gambling propensity on the manager level are unavailable. In a recent paper, Kumar, Page, and Spalt (2009) use a geographical identification strategy to measure gambling propensity on the county level and argue that local gambling attitudes have a strong influence of the personal gambling attitudes of individuals, and therefore also institutions and corporations, located in the county. They identify gambling propensity by the proportion of the local Catholic population relative to the local Protestant population, drawing on a large body of evidence showing that Catholics, on average, gamble significantly more. They show that the ratio of Catholics to Protestants (CPRATIO) captures the gambling attitudes of both retail investors as well as institutional investors and corporations headquartered in the county. In our first test, we compute CPRATIO annually for all US counties and assign them to the high category if CPRATIO is in the top terzile across counties in that year, and to the low category otherwise. If our effects are reflecting gambling attitudes, then we should see stronger effects in the high CPRATIO subsample, which is where local gambling propensity is strongest (Hypothesis 4a).

Columns 2 and 3 in Table 7 present results. We find a slightly higher offer price premium in the high CPRATIO subsample. For the synergies, however, the difference is striking and much stronger in the subsample of firms located in regions where the local population is likely to find gambling attractive. The coefficient on LIDX is almost doubling relative to the baseline. We observe the same pattern for acquiror announcement returns, which are strongly negative in LIDX for the high CPRATIO subsample. Target announcement returns, which reflect the joint effect of higher offer price premia and lower synergies, are slightly lower in the high CPRATIO subsample, suggesting that the lower synergies are the dominant effect. Overall, these results are consistent with the view that managers located in areas in which the local population finds gambling attractive are willing to accept lower expected synergies if the target looks like an attractive gambling opportunity, and that the capital market reacts by adjusting the valuation of the acquiror downwards. We interpret these results as strong confirmatory evidence for Hypothesis 4a.

These findings are useful in distinguishing gambling from overconfidence. In particular, to the best of our knowledge there is no work that relates Catholicism to being overconfident, which makes a gambling explanation much more plausible. The findings also show that our results are not simply driven by the fact that lottery firms are exactly those firms for which valuation exercises are hardest, which might make it easier for managers to argue for higher prices. Since lottery firms in Catholic regions are not more difficult to value than firms in Protestant regions, the difference in our effects across these regions cannot be explained by valuation difficulties.

We also consider heightened propensity to gamble induced by macroeconomic conditions (Hypothesis 4b). If business opportunities deteriorate in economic downturns, then gambling is likely to become more attractive, consistent with existing evidence from lottery-ticket sales and retail investment in lottery stocks (Brenner and Brenner (1990), Mikesell (1994), Kumar (2009)). As a measure of economic conditions, we use the Chicago Fed national activity index (CFNAI), which is is a monthly index designed to gauge overall economic activity by combining information in 85 separate economic indicators on production and income, employment, unemployment and hours, personal consumption and housing, sales, orders, and inventories. The index is constructed such that a positive (negative) index value indicates economic growth above (below) the trend.

Columns 4 and 5 in Table 7 show results when we split our sample by positive and negative CFNAI index values two months prior to the announcement. The magnitudes of the coefficients on the offer price premium, announcement returns are much larger for the negative CFNAI values subsample, consistent with the hypothesis that bad economic conditions make gambling relatively more attractive. They are also more significant in this subsample, especially for synergies, which are significant only in economic downturns. Overall, these results are consistent with the evidence obtained from lottery tickets and retail investors and suggest that lottery acquisitions become more attractive in economic downturns, which leads to higher offer prices, lower synergies, and lower announcement returns for bidders.

5.2 Managerial discretion

Hypothesis 5 states that managerial gambling attitudes should be more likely to influence M&A pricing, if the top decision makers are more entrenched, or otherwise shielded from competitive forces which would contain overpayment. We test this hypothesis by using two well-known measures of managerial discretion. The first measure is the corporate governance index (GIM) of Gompers, Ishii, and Metrick (2003), the second measure is the level of product market competition (Giroud and Mueller (2010)).[13]

Columns 6 and 7 of Table 7 present results, when we split the sample by the GIM index of the acquiror (since the index is available only for a subset of firms and years, we loose many observations in this test). We observe that firms with a high GIM index (which Gompers, Ishii, and Metrick (2003) label "dictatorship" firms) are much more sensitive to the lottery characteristics of the target. In these firms, the offer price premium is significantly higher, and both synergies and announcement returns for acquirors are significantly lower. By contrast, the effects for firms with low GIM index values ("democracies") are much weaker, indicating that the thread of replacing underperforming managements enforces some discipline to the pricing of M&A deals and contains the tendency of managers to gamble on acquisitions. We find very similar results when we split the sample by the fierceness of product market competition in the acquirors 3-digit SIC code industry (columns 8 and 9). Stronger competition in product markets makes it more costly to loose value on bad acquisitions and induces an incentive to invest into good project appraisal processes. Consistent with this idea, we find that bidders in weaker competitive environments have significantly higher offer price premia, lower synergies, and lower announcement returns in lottery acquisitions, than bidders in highly competitive

[13]We obtain very similar results when we use the E-Index proposed by Bebchuk, Cohen, and Ferrell (2009), which uses a subset of the variables in the GIM-Index.

product markets. Overall, these results strongly support Hypothesis 5.

5.3 Gambling in the loss space

In this section we test additional predictions from prospect theory. A main feature captured by prospect theory is that the willingness to accept gambles increases in the loss space. Kahneman and Tversky (1979) illustrate this by the observation that most people would prefer $3,000 for sure over a 80% chance to win $4,000 and nothing otherwise, while preferring a gamble involving a 20% chance to pay nothing (and thus to break even), and 80% chance to loose $4,000 to a sure loss of $3,000. In this simple example, a natural point of reference is zero, and the observed preferences can be described by a value function that is concave in the gain space (values above the reference points of zero), and convex in the loss space.

We hypothesize that the reasoning in this simple experiment carries over also to the more complex setting of corporate takeovers and that managers find gambling more attractive when they are in the loss space and when a successful bet gives them a chance to get out of it (Hypothesis 6). We suggest four situations in which managers feel the desire to enter a gamble to break even. First, we conjecture that a manager will feel in the loss space if the firm's stock return has been particularly low over the last year. Second, we conjecture that the feeling of lagging behind expectations is stronger the closer the firm is to bankruptcy. Third, the more the stock price of the acquiror is below its 52 week high, the more likely it is that the manager feels to be in the loss space. Lastly, we use an accounting measure and conjecture that being in the loss space is more likely if the firm has reported negative net income in the previous fiscal year.

Table 8 presents results. In all four settings we find evidence consistent with our gambling hypothesis. The impact of LIDX on offer price premia, synergies, and announcement returns is much stronger if the manager is more likely to feel being in the loss space, which would increase his propensity to gamble. As in the setting with CPRATIO, the effects are particularly pronounced for synergies and acquiror announcement returns. Specifically, both synergies and bidder announcement returns are much smaller if the firm has performed poorly over the last 12 months, if the firm is closer to bankruptcy as measured by the Z-Score (Altman (1968)), if the difference of the current stock price to the 52 week high is large, or if the firms has reported negative earnings at the last fiscal year end. This evidence provides clear support of Hypothesis 6.[14]

Since it seems implausible to assume that, for example, managers in firms closer to bankruptcy are more optimistic and overconfident, these results are also strong additional evidence showing that overconfidence and optimism cannot explain our findings.

6. Conclusion

In this paper we conjecture that gambling attitudes among top managers are important for takeover decisions. Our work is motivated by well-known stylized facts of individual decision making. In particular the probability weighting feature of prospect theory, which induces a preference for lottery-like skewed payoffs, might have tangible effects on deal pricing and market reactions to merger bids. To test this conjecture we first form an index measuring how much a target firm's stock shares salient characteristics of lottery tickets: high skewness and volatility, and low price. We then show that offer price premia and target announcement returns are higher, and synergies and bidder announcement returns are lower in transactions involving targets with lottery features.

Biases among top decision makers will be more likely to enter M&A pricing if the bias is stronger, or if managers have more discretion in making decisions. Testing these finer predictions, we find strong evidence suggesting that our effects are concentrated among firms

[14]Note that our results do not simply reflect the well-known asset substitution problem (e.g. Jensen and Meckling (1976)). Under this theory, equity-holders benefit at the expense of bondholders by increasing firm risk since they effectively own a call option on the firm value – an effect which is more relevant for firms in financial distress. We find that acquiror returns are more *negative* in lottery acquisitions when the firm is closer to distress (low Z-Score). If the asset substitution problem were a first order issue in our setting, we would expect exactly the opposite. As an alternative way to show that our results are not capturing specifics of firms closer to distress, rather than loss-space effects, we find that the results for RET12, DIFF52, and Net Income are qualitatively unchanged when we add the Z-Score to the set of control variables (results not reported).

headquartered in counties in which the local populations is likely to find gambling attractive, for firms in which managers are more entrenched, for firms facing weaker product market competition, during economic downturns, and in situations where the firm has recently performed poorly, giving managers an incentive to gamble to break even. The latter situations might arise for firms with weak stock price performance in the recent past, firms closer to bankruptcy, and firms which reported negative earnings in the last fiscal year. Overall, we interpret our results as strong evidence suggesting that managerial gambling attitudes matter for M&A pricing.

Our findings have important implications. In the context of corporate governance we suggest a new channel, gambling in acquisitions, through which managers might jeopardize shareholder wealth. We show that problems induced by probability weighting will be particularly relevant for targets that score high on the lottery index. In the context of research on biased managers, our results, which suggest that probability weighting is important, and the work by Baker, Pan, and Wurgler (2009), which shows that reference points are important, jointly suggest that prospect theory could be relevant in understanding how top managers make decisions. One obstacle to future growth of this line of inquiry in corporate finance is that very little theoretical work exists which could help to guide future empirical efforts in this direction. In our view, developing tractable models in which managers have preferences which can incorporate probability weighting and reference points is an important task for future research.

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TABLE 1
Sample

This table shows the number of acquisitions by year and the lottery characteristics of targets in those acquisitions as measured by the lottery index LIDX. LIDX measures the similarity of the stock of the target with salient features of lottery tickets (low price, high idiosyncratic volatility and expected idiosyncratic skewness). LIDX increases in the attractiveness of the target as a gamble. We form high and low groups by splitting the pooled sample at the median value of LIDX. See Appendix Table A1 for a definition of LIDX.

Year	Full Sample	High LIDX	Low LIDX	% High LIDX
1986	198	90	108	45.5%
1987	184	94	90	51.1%
1988	295	137	158	46.4%
1989	224	117	107	52.2%
1990	123	61	62	49.6%
1991	92	51	41	55.4%
1992	109	57	52	52.3%
1993	184	95	89	51.6%
1994	259	129	130	49.8%
1995	322	155	167	48.1%
1996	331	154	177	46.5%
1997	424	169	255	39.9%
1998	477	226	251	47.4%
1999	550	240	310	43.6%
2000	444	188	256	42.3%
2001	317	167	150	52.7%
2002	183	105	78	57.4%
2003	241	145	96	60.2%
2004	204	97	107	47.5%
2005	222	119	103	53.6%
2006	272	137	135	50.4%
2007	304	122	182	40.1%
2008	228	129	99	56.6%
Total	6,187	2,984	3,203	48.2%

TABLE 2
Summary Statistics

This table displays descriptive statistics for the main variables used in our analysis. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. ROA is the bidder (target) firm return on assets from the last fiscal year before the takeover announcement. BM is the bidder (target) firm book to market ratio at the last fiscal year end before the takeover announcement. MCAP is the bidder (target) firm market capitalization at the last fiscal year end before the takeover announcement. Relative size is the transaction value over bidder's market capitalization at the last fiscal year end before the takeover announcement. New economy is a dummy variable indicating that the target is a new economy firm (SIC codes 3570 to 3579, 3661, 3674, 5045, 5961, or 7370 to 7379). OPP is the offer price premium defined as the bid price over the target's stock price 4 weeks before the takeover announcement minus one. A(T)CAR[-1,+1] are bidder (target) announcement returns computed using the [-1,+1] event window and a market model estimated over days [-230,-31]. Synergy [-1,+1] is defined as weighted sum (by market capitalization) of the bidder and target cumulative abnormal announcement returns following Bradley, Desai, and Kim (1988). Cash (Stock) is a dummy variable indicating that a deal is financed with cash (stock) only. Tender is a dummy variable indicating a tender offer. Hostile is a dummy variable indicating hostile deals. Conglomerate is a dummy variable indicating that bidder and target are in a different 2-digit SIC code industry. Competed is a dummy variable indicating deals with more than one bidder. log(Number of Deals) is the natural log of the number of sample transactions in the target's 2-digit SIC code industry in the year of the takeover announcement. CPRATIO is the ratio of Catholic to Protestant population in the county where the headquarter of the bidder is located. The CFNAI is the Chicago Fed National Activity Index. The GIM-Index is an index developed by Gompers, Ishii, and Metrick (2003) measuring management entrenchment. Product market competition (PM Competition) is the Herfindahl index (sum of squared market shares measured in sales) in the acquiror's 3-digit SIC code industry. Z-Score is Altman's (1968) z-score, as modified by MacKie-Mason (1990). RET12 is the cumulative return of the bidder's stock calculated over months $t-13$ to $t-2$ for a takeover announcement in month t. DIFF52 is the ratio of the bidder's stock price at the end of month $t-2$ and the 52 week high over months $t-13$ to $t-2$ minus one. Negative Net Income is a dummy variable equal to one if net income of the bidder was negative at last fiscal year end. See Appendix Table A.1 for a detailed overview of variable definitions.

TABLE 2 (Continued)
Summary Statistics

Variable	Mean	Median	SD	Min	25^{th} pctl.	75^{th} pctl.	Max	N
Lottery variables								
LIDX	0.50	0.49	0.25	0.00	0.30	0.70	1.00	6,187
EISKEW	0.70	0.64	0.53	-0.39	0.34	0.98	2.44	6,187
IVOLA	3.61	3.11	2.04	0.67	2.16	4.49	21.47	6,187
Price	16.88	12.80	16.09	0.07	5.75	23.34	223.56	6,187
Acquiror and target characteristics								
Acquiror ROA	0.02	0.03	0.12	-0.73	0.01	0.08	0.22	3,750
Acquiror BM Ratio	0.66	0.47	0.96	0.04	0.28	0.73	8.08	3,698
Acquiror MCAP ($bn)	8.30	1.27	21.77	0.01	0.29	5.05	139.94	3,758
Target ROA	-0.02	0.02	0.19	-1.09	-0.02	0.06	0.24	5,917
Target BM Ratio	0.78	0.64	0.59	0.05	0.40	0.97	3.68	5,748
Target MCAP ($bn)	0.63	0.11	1.72	0.00	0.04	0.40	12.81	6,026
Relative Size	0.60	0.24	1.11	0.00	0.07	0.67	8.08	3,753
New Economy	0.16	0	0.37	0	0	0	1	6,183
Deal characteristics								
OPP	42.88	35.27	44.44	-51.56	18.10	58.43	297.06	6,025
ACAR [-1,+1] (%)	-1.67	-1.14	6.90	-23.48	-4.85	1.68	19.08	3,614
TCAR [-1,+1] (%)	20.50	16.21	22.34	-21.75	5.48	30.31	108.01	6,123
Synergy [-1;+1] (%)	1.54	0.96	6.95	-19.23	-1.94	4.63	26.22	3,443
Cash	0.41	0	0.49	0	0	1	1	6,187
Stock	0.28	0	0.45	0	0	1	1	6,187
Tender	0.20	0	0.40	0	0	0	1	6,187
Hostile	0.02	0	0.13	0	0	0	1	6,187
Conglomerate	0.47	0	0.50	0	0	1	1	6,187
Competed	0.11	0	0.31	0	0	0	1	6,187
log(Number of Deals)	2.80	2.83	1.27	0.00	1.95	3.91	4.93	6,187
Completed	0.75	1	0.44	0	0	1	1	6,187
Gambling propensity								
CPRATIO	1.53	1	1.57	0	1	2	7	5,194
CFNAI	0.04	0.19	0.51	-2.28	-0.20	0.36	0.82	6,187
Managerial discretion variables								
GIM-Index	9.42	9	2.70	2	7	11	16	1,428
PM Competition	0.16	0.11	0.15	0.01	0.06	0.20	1.00	5,651
Variables indicating loss space								
RET12	0.11	0.02	0.77	-0.98	-0.25	0.32	32.25	6,187
Z-Score	1.62	1.80	1.92	-22.21	0.99	2.55	8.47	2,651
DIFF52	0.77	0.27	2.28	-0.27	0.09	0.71	68.14	6,183
Negative Net Income	0.15	0.00	0.35	0.00	0.00	0.00	1.00	3,750

TABLE 3
Offer price premium

This table presents results for OLS regressions of the offer price premium on lottery measures and control variables. Offer price premium (OPP) is defined as the bid price over the target's stock price 4 weeks before the takeover announcement minus 1. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. All variables are defined in Appendix Table A.1. The t-statistics for the coefficient estimates are reported in small font size below the estimates. Standard errors are clustered by announcement month.

TABLE 3 (Continued)

Offer price premium

Dependent var.:	Offer Price Premium							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LIDX	31.792				27.932			
	7.19				6.00			
EISKEW		11.722				9.696		
		5.26				4.53		
IVOLA			2.867				2.400	
			4.78				3.94	
Price				-0.259				-0.219
				-3.68				-3.14
Acquiror ROA	17.348	19.308	18.944	14.397	14.374	14.513	14.119	10.972
	1.79	1.97	1.90	1.47	1.49	1.48	1.42	1.12
Acquiror BM Ratio	-2.746	-2.936	-2.602	-2.845	-2.601	-2.795	-2.566	-2.695
	-3.18	-3.38	-3.01	-3.19	-3.04	-3.25	-3.01	-3.08
Acquiror MCAP	4.424	4.281	4.282	4.566	4.314	4.164	4.129	4.380
	6.79	6.57	6.51	6.95	6.53	6.28	6.18	6.60
Target ROA	3.386	0.365	1.465	-4.703	3.930	1.592	2.053	-2.378
	0.42	0.05	0.19	-0.61	0.49	0.21	0.26	-0.31
Target BM Ratio	9.101	7.487	9.028	8.101	8.670	7.310	8.465	7.941
	4.54	3.76	4.46	4.08	4.24	3.63	4.15	3.94
Target MCAP	-4.443	-5.567	-5.729	-5.885	-4.872	-5.878	-5.986	-6.100
	-5.37	-6.86	-7.01	-7.25	-5.48	-6.95	-6.97	-7.23
Relative Size	5.850	5.881	5.714	6.168	5.236	5.218	5.059	5.431
	5.72	5.64	5.51	5.88	5.28	5.16	5.04	5.39
Cash					-1.230	-0.336	-0.481	-0.624
					-0.61	-0.17	-0.24	-0.31
Stock					0.738	0.445	-0.393	0.545
					0.50	0.31	-0.27	0.38
Tender					10.967	10.179	10.412	10.556
					4.97	4.68	4.76	4.84
Hostile					6.548	5.948	5.796	4.993
					1.66	1.50	1.47	1.29
Conglomerate					-0.779	-0.698	-0.682	-0.351
					-0.51	-0.46	-0.45	-0.23
Competed					16.095	15.619	16.537	16.835
					5.34	5.20	5.53	5.60
New Economy					5.656	8.396	6.713	8.858
					2.61	4.01	3.09	3.86
log(Number of Deals)					0.578	-0.366	0.123	-0.016
					0.95	-0.61	0.20	-0.03
Adjusted R^2	0.085	0.082	0.079	0.074	0.109	0.107	0.105	0.102
Number of observations	3,356	3,356	3,356	3,356	3,355	3,355	3,355	3,355

TABLE 4
Synergies

This table presents results for OLS regressions of synergies on lottery measures and control variables. Synergies are defined following Bradley, Desai, and Kim (1988) as weighted sum (by market capitalization) of the bidder and target cumulative abnormal announcement returns. Bidder and target announcement returns are computed using the [-1,+1] event window and a market model estimated over days [-230,-31]. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. All variables are defined in Appendix Table A.1. The t-statistics for the coefficient estimates are reported in small font size below the estimates. Standard errors are clustered by announcement month.

TABLE 4 (Continued)
Synergies

Dependent var.:	Synergy [-1,+1]							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LIDX	-1.577				-2.228			
	-2.24				-3.12			
EISKEW		-0.682				-0.641		
		-1.76				-1.80		
IVOLA			-0.515				-0.478	
			-5.45				-5.10	
Price				0.011				0.018
				1.10				1.76
Acquiror ROA	2.586	2.468	2.018	2.684	0.418	0.499	0.033	0.644
	1.44	1.38	1.13	1.49	0.24	0.29	0.02	0.37
Acquiror BM Ratio	0.980	0.988	0.952	0.986	0.739	0.749	0.729	0.751
	4.61	4.65	4.54	4.65	3.58	3.63	3.56	3.64
Acquiror MCAP	-0.313	-0.305	-0.282	-0.321	-0.450	-0.440	-0.417	-0.457
	-3.19	-3.08	-2.86	-3.28	-4.71	-4.58	-4.36	-4.79
Target ROA	0.757	0.848	-0.305	1.176	0.192	0.456	-0.404	0.680
	0.75	0.86	-0.31	1.18	0.20	0.48	-0.42	0.71
Target BM Ratio	0.341	0.426	0.204	0.390	0.039	0.143	-0.026	0.098
	1.21	1.55	0.74	1.39	0.13	0.51	-0.09	0.34
Target MCAP	-0.178	-0.136	-0.316	-0.096	-0.122	-0.022	-0.186	-0.025
	-1.18	-0.93	-2.26	-0.70	-0.83	-0.15	-1.34	-0.18
Relative Size	1.054	1.052	1.099	1.038	0.997	0.998	1.037	0.978
	5.40	5.40	5.65	5.35	5.23	5.25	5.44	5.15
Cash					1.148	1.088	1.062	1.103
					3.79	3.64	3.55	3.66
Stock					-1.304	-1.273	-1.156	-1.283
					-4.33	-4.24	-3.89	-4.21
Tender					1.559	1.608	1.619	1.582
					4.46	4.60	4.58	4.54
Hostile					2.332	2.408	2.345	2.484
					3.11	3.23	3.19	3.36
Conglomerate					-0.374	-0.387	-0.333	-0.405
					-1.58	-1.64	-1.40	-1.72
Competed					-1.073	-1.045	-1.140	-1.129
					-2.52	-2.46	-2.65	-2.64
New Economy					-0.939	-1.190	-0.620	-1.183
					-2.40	-3.17	-1.67	-2.96
log(Number of Deals)					-0.266	-0.192	-0.286	-0.220
					-2.68	-2.04	-2.87	-2.32
Adjusted R^2	0.098	0.098	0.109	0.097	0.141	0.140	0.148	0.140
Number of observations	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262

TABLE 5
Announcement returns

This table presents results for OLS regressions of acquiror announcement returns (ACAR[-1,+1]) in Panel A and target announcement returns (TCAR[-1,+1]) in Panel B on lottery measures and control variables. Bidder and target cumulative abnormal announcement returns are computed using the [-1,+1] event window and a market model estimated over days [-230,-31]. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. All variables are defined in Appendix Table A.1. The t-statistics for the coefficient estimates are reported in small font size below the estimates. Standard errors are clustered by announcement month.

TABLE 5 (Continued)
Announcement returns

Panel A: Acquiror announcement returns

Dependent var.:	ACAR [-1,+1]							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LIDX	-2.492				-3.161			
	-3.69				-4.39			
EISKEW		-1.024				-0.930		
		-3.01				-2.82		
IVOLA			-0.510				-0.469	
			-5.89				-5.16	
Price				0.026				0.030
				2.09				2.44
Acquiror ROA	0.750	0.568	0.233	0.896	-1.078	-0.988	-1.326	-0.773
	0.36	0.27	0.11	0.43	-0.52	-0.47	-0.64	-0.37
Acquiror BM Ratio	0.609	0.622	0.582	0.625	0.409	0.425	0.400	0.430
	3.78	3.82	3.66	3.86	2.53	2.60	2.48	2.64
Acquiror MCAP	0.449	0.461	0.475	0.436	0.338	0.353	0.370	0.328
	4.44	4.57	4.69	4.32	3.29	3.45	3.62	3.19
Target ROA	-1.039	-0.857	-1.774	-0.470	-1.739	-1.373	-2.046	-1.089
	-1.20	-1.02	-2.06	-0.56	-2.00	-1.64	-2.35	-1.28
Target BM Ratio	0.124	0.259	0.025	0.196	-0.120	0.031	-0.149	-0.040
	0.43	0.89	0.09	0.67	-0.40	0.10	-0.51	-0.13
Target MCAP	-1.119	-1.044	-1.169	-1.032	-1.057	-0.917	-1.034	-0.942
	-7.66	-7.64	-8.65	-7.54	-7.02	-6.54	-7.41	-6.65
Relative Size	-0.082	-0.087	-0.045	-0.115	-0.128	-0.128	-0.090	-0.159
	-0.46	-0.48	-0.25	-0.64	-0.73	-0.72	-0.52	-0.90
Cash					1.367	1.281	1.265	1.300
					4.49	4.26	4.19	4.29
Stock					-0.838	-0.794	-0.670	-0.816
					-2.81	-2.66	-2.27	-2.71
Tender					0.583	0.656	0.653	0.621
					1.80	2.05	2.00	1.94
Hostile					0.182	0.292	0.247	0.402
					0.25	0.39	0.34	0.55
Conglomerate					-0.068	-0.088	-0.046	-0.113
					-0.25	-0.32	-0.17	-0.42
Competed					-0.525	-0.480	-0.598	-0.614
					-1.16	-1.06	-1.32	-1.35
New Economy					-0.993	-1.342	-0.837	-1.314
					-2.53	-3.56	-2.18	-3.36
log(Number of Deals)					-0.366	-0.261	-0.352	-0.307
					-3.40	-2.58	-3.33	-3.03
Adjusted R^2	0.041	0.041	0.049	0.039	0.068	0.066	0.072	0.065
Number of observations	3,328	3,328	3,328	3,328	3,327	3,327	3,327	3,327

TABLE 5 (Continued)
Announcement returns

Panel B: Target announcement returns

Dependent var.:	TCAR [-1,+1]							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LIDX	13.609				10.893			
	5.93				4.30			
EISKEW		5.533				5.078		
		4.62				4.32		
IVOLA			0.605				0.400	
			2.10				1.32	
Price				-0.157				-0.119
				-4.99				-3.93
Acquiror ROA	11.122	12.177	10.651	10.021	6.541	7.153	5.418	5.375
	2.84	3.07	2.67	2.57	1.67	1.81	1.36	1.38
Acquiror BM Ratio	1.258	1.166	1.295	1.176	0.672	0.572	0.683	0.610
	2.78	2.58	2.87	2.62	1.48	1.26	1.50	1.34
Acquiror MCAP	3.417	3.348	3.400	3.507	2.934	2.860	2.895	2.984
	10.03	9.83	9.88	10.29	8.51	8.34	8.33	8.65
Target ROA	0.408	-0.505	-2.397	-2.513	-0.114	-0.179	-2.271	-2.232
	0.14	-0.17	-0.78	-0.82	-0.04	-0.06	-0.75	-0.74
Target BM Ratio	2.923	2.215	2.688	2.527	2.842	2.237	2.641	2.572
	3.19	2.49	2.88	2.83	3.04	2.44	2.80	2.80
Target MCAP	-2.789	-3.207	-3.669	-3.182	-2.543	-2.767	-3.256	-2.867
	-6.44	-7.74	-8.76	-8.24	-5.70	-6.65	-7.57	-7.19
Relative Size	0.470	0.475	0.471	0.664	0.451	0.437	0.419	0.573
	1.14	1.14	1.14	1.62	1.09	1.04	1.01	1.38
Cash					3.031	3.412	3.268	3.269
					2.71	3.05	2.89	2.92
Stock					-1.803	-1.867	-2.148	-1.805
					-2.04	-2.13	-2.44	-2.06
Tender					6.671	6.333	6.495	6.516
					5.44	5.21	5.31	5.36
Hostile					8.171	8.043	7.695	7.486
					4.19	4.10	3.93	3.82
Conglomerate					-0.319	-0.343	-0.177	-0.171
					-0.41	-0.44	-0.23	-0.22
Competed					-5.608	-5.898	-5.450	-5.254
					-5.24	-5.48	-5.11	-4.91
New Economy					1.046	1.860	2.266	2.067
					0.89	1.67	1.96	1.87
log(Number of Deals)					0.043	-0.325	-0.240	-0.138
					0.13	-1.01	-0.71	-0.42
Adjusted R^2	0.096	0.096	0.087	0.093	0.126	0.129	0.121	0.125
Number of observations	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427

TABLE 6
Robustness checks

This table presents results for OLS regressions of offer price premium (OPP), acquiror announcement returns (ACAR[-1,+1]), target announcement returns (TCAR [-1,+1]), and Synergy [-1,+1] on our lottery measures LIDX and control variables. Bidder and target cumulative abnormal announcement returns are computed using the [-1,+1] event window and a market model estimated over days [-230,-31]. Synergy [-1,+1] is defined following Bradley, Desai, and Kim (1988) as weighted sum (by market capitalization) of the bidder and target cumulative abnormal announcement returns. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. All variables are defined in Appendix Table A.1. The table reports the coefficient estimates of LIDX and its t-statistic as well as the number of observations in small font size below the estimates. The baseline regression is model (5) from Tables 3 to 5. In Panel A the baseline regression is rerun for 4 different LIDX variables based on alternative prediction periods of EISKEW. Panel A also reports the results of the baseline regression for different event windows. In Panel B the baseline regression is rerun for different subsamples: (i) only deals with acquirors above or below the median acquiror size in the respective year of the takeover announcement, (ii) only deals with targets above or below the median target size in the respective year of the takeover announcement, (iii) only deals announced when investor sentiment is above or below the median investor sentiment over our sample period; investor sentiment data is taken from Jeffrey Wurgler's website and lagged by 2 months, (iv) only deals from one of the three subperiods 1986 to 1993, 1994 to 2001, and 2002 to 2008. In Panel C the baseline regression is rerun including an number of additional controls: (i) year fixed effects, (ii) year and industry fixed effects (2-digit SIC), (iii) operating cash flow over total assets and total debt over firm market value of the acquiror at the last fiscal year end before the takeover announcement, excluding financial firms from the sample, (iv) Amihud's (2002) measure of liquidity for the target estimated over the month $t-2$ for a takeover announcement in month t, (v) systematic risk and coskewness, each estimated a 3-year period from the beginning of month $t-37$ until the end of month $t-2$ for a takeover announcement in month t, and (vi) Altman's (1968) Z-Score. Panel C also reports the results of the baseline regression for a number of different specifications: (vii) only completed deals are included, (viii) all deals with new economy targets (SIC codes 3570 to 3579, 3661, 3674, 5045, 5961, or 7370 to 7379) are excluded, (ix) only deals with relative size (deal value over bidder market capitalization) larger 1%, (x) only deals with targets having a stock price above $5 at the end of end of month $t-2$ for a takeover announcement in month t are included, (xi) none of the dependent and independent variables is winsorized, (xii) median instead of OLS regression model is used, (xiii) dependent variables are expressed in US$ instead of percentage terms. Standard errors are clustered by announcement month for all OLS regressions.

TABLE 6 (Continued)
Robustness checks

Panel A: Alternative estimation periods

Variable	OPP	ACAR	TCAR	Synergy
	(1)	(2)	(3)	(4)
Baseline	27.932	-3.161	10.893	-2.228
	6.00	-4.39	4.30	-3.12
	3,355	3,327	3,427	3,262
Alternative EISKEW prediction periods				
1 year	34.744	-3.208	13.397	-2.079
	7.25	-4.51	5.02	-2.98
	3,360	3,329	3,430	3,263
2 years	31.680	-3.292	12.390	-2.276
	6.90	-4.53	4.83	-3.24
	3,359	3,328	3,430	3,263
4 years	27.907	-3.662	10.053	-2.816
	6.06	-5.10	4.01	-4.11
	3,353	3,325	3,425	3,260
5 years	26.075	-3.402	10.085	-2.667
	5.82	-4.57	4.04	-3.79
	3,351	3,323	3,423	3,258
Alternative event windows				
[-2,+2]	n.a.	-2.776	11.103	-1.768
		-3.28	4.33	-2.04
		3,327	3,427	3,262
[-3,+3]	n.a.	-2.585	10.107	-2.048
		-2.89	3.98	-2.25
		3,327	3,427	3,261
[-5,+5]	n.a.	-2.603	11.328	-1.888
		-2.55	4.52	-1.75
		3,327	3,427	3,262

TABLE 6 (Continued)
Robustness checks

Panel B: Subsamples

Variable	OPP	ACAR	TCAR	Synergy
	(1)	(2)	(3)	(4)
Baseline	27.932	-3.161	10.893	-2.228
	6.00	-4.39	4.30	-3.12
	3,355	3,327	3,427	3,262
Large acquiror	30.473	-1.651	15.276	-1.720
	4.30	-1.69	3.64	-1.86
	1,689	1,714	1,730	1,683
Small acquiror	30.455	-4.766	9.292	-3.388
	4.74	-3.95	2.77	-2.88
	1,666	1,613	1,697	1,579
Large target	22.146	-3.037	7.226	-2.893
	3.16	-2.65	2.27	-2.42
	1,861	1,852	1,904	1,819
Small target	37.994	-3.377	15.934	-1.796
	5.44	-3.43	4.03	-1.84
	1,494	1,475	1,523	1,443
High sentiment	33.299	-2.428	11.319	-1.423
	5.47	-2.31	3.41	-1.32
	1,449	1,454	1,499	1,430
Low sentiment	25.298	-4.542	5.179	-4.182
	3.16	-4.03	1.26	-3.68
	1,540	1,516	1,565	1,480
Years 1986-1993	47.651	-0.892	18.663	1.590
	4.08	-0.55	2.98	1.02
	543	532	550	528
Years 1994-2001	28.671	-3.351	6.603	-3.396
	4.09	-3.17	1.84	-3.10
	1,903	1,911	1,978	1,863
Years 2002-2008	39.228	-4.642	17.403	-2.452
	5.68	-2.99	3.70	-1.80
	909	884	899	871

TABLE 6 (Continued)
Robustness checks

Panel C: Alternative regression specifications

Variable	OPP	ACAR	TCAR	Synergy
	(1)	(2)	(3)	(4)
Baseline	27.932	-3.161	10.893	-2.228
	6.00	-4.39	4.30	-3.12
	3,355	3,327	3,427	3,262
Year dummies	33.344	-3.253	9.759	-2.848
	6.68	-4.19	3.69	-3.62
	3,355	3,327	3,427	3,262
Year and industry dummies	24.471	-3.055	7.265	-2.702
	4.55	-3.86	2.65	-3.40
	3,355	3,327	3,427	3,262
Additional controls (no banks)	25.418	-3.363	10.752	-3.014
	3.94	-3.53	3.40	-3.27
	2,440	2,402	2,481	2,357
Control for liquidity (Amihud)	26.126	-3.070	10.057	-2.254
	5.61	-4.24	3.98	-3.14
	3,354	3,326	3,426	3,261
Control for beta and coskewness	26.311	-2.392	11.234	-1.657
	5.51	-3.37	4.17	-2.35
	3,355	3,327	3,427	3,262
Control for Z-Score	25.405	-3.797	10.875	-3.001
	3.98	-3.93	3.36	-3.20
	2,393	2,358	2,436	2,312
Only completed deals	29.248	-2.408	11.095	-1.434
	6.55	-3.03	3.85	-1.90
	2,802	2,783	2,857	2,729
Exclude new economy	24.594	-2.505	12.373	-1.328
	4.77	-3.51	4.65	-1.90
	2,750	2,747	2,824	2,696
Relative size >1%	30.431	-3.212	10.510	-2.267
	7.05	-4.22	4.23	-2.97
	3,155	3,125	3,225	3,066
Price above $5	14.215	-1.921	4.329	-1.358
	2.88	-2.14	1.60	-1.54
	2,734	2,721	2,799	2,667
No winsorization of variables	17.243	-4.178	12.953	-2.696
	2.94	-5.12	4.98	-3.39
	3,355	3,327	3,427	3,262
Median regression	20.369	-2.205	5.506	-1.134
	5.56	-3.84	2.16	-1.71
	3,355	3,327	3,427	3,262
$CARs [-1,+1]	n.a.	-243.903	127.616	-105.933
		-3.18	4.82	-1.29
		3,262	3,427	3,262

TABLE 7
Gambling propensity and managerial discretion

This table presents results for OLS regressions of offer price premium (OPP), acquiror announcement returns (ACAR[-1,+1]), target announcement returns (TCAR [-1,+1]), and Synergy [-1,+1] on our lottery measures LIDX and control variables. Bidder and target cumulative abnormal announcement returns are computed using the [-1,+1] event window and a market model estimated over days [-230,-31]. Synergy [-1,+1] is defined following Bradley, Desai, and Kim (1988) as weighted sum (by market capitalization) of the bidder and target cumulative abnormal announcement returns. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. The baseline regression is model (5) from Tables 3 to 5. The baseline regression is rerun for 8 different subsamples: (i) high (low) CPRATIO (the ratio of Catholic to Protestant population in the county where the acquiror headquarter is located), defined as CPRATIO values in (below) the top terzile, (ii) negative or positive CFNAI (the Chicago Fed National Activity Index), (iii) above or below median acquiror management entrenchment measured by the GIM-Index, (iv) above or below median product market competition (PM Comp.) measured by the Herfindahl index (sum of squared market shares measured in sales) in the acquiror's 3-digit SIC code industry. The table reports the coefficient estimates of LIDX and its t-statistic as well as the number of observations in small font size below the estimates. See Appendix Table A.1 for a detailed overview of variable definitions. Standard errors are clustered by announcement month.

	Baseline	CPRATIO		CFNAI		GIM Index		PM Comp.	
Variable	Estimates	High	Low	Pos.	Neg.	High	Low	High	Low
OPP	27.932	30.897	28.454	21.959	37.876	15.769	7.678	23.706	30.792
	6.00	3.71	4.07	4.33	4.26	1.17	0.83	2.84	4.82
	3,355	1,542	1,263	2,140	1,215	581	692	1,325	1,761
ACAR [-1,+1]	-3.161	-5.245	-1.622	-2.221	-4.511	-6.357	-2.042	-1.682	-4.619
	-4.39	-4.52	-1.50	-2.43	-3.87	-3.96	-1.46	-1.62	-4.52
	3,327	1,527	1,271	2,145	1,182	609	708	1,337	1,724
TCAR [-1,+1]	10.893	9.745	7.414	7.167	16.880	2.511	3.802	10.863	10.370
	4.30	2.74	1.97	2.36	3.88	0.44	0.69	2.71	2.88
	3,427	1,579	1,297	2,214	1,213	607	702	1,361	1,786
Synergy [-1,+1]	-2.228	-4.649	-1.080	-1.031	-3.861	-5.609	-1.886	-0.724	-3.994
	-3.12	-4.32	-1.00	-1.23	-3.29	-3.73	-1.53	-0.73	-3.90
	3,262	1,495	1,246	2,102	1,160	599	696	1,309	1,690

TABLE 8
Gambling in the loss space

This table presents results for OLS regressions of offer price premium (OPP), acquiror announcement returns (ACAR[-1,+1]), target announcement returns (TCAR [-1,+1]), and Synergy [-1,+1] on our lottery measures LIDX and control variables. Bidder and target cumulative abnormal announcement returns are computed using the [-1,+1] event window and a market model estimated over days [-230,-31]. Synergy [-1,+1] is defined following Bradley, Desai, and Kim (1988) as weighted sum (by market capitalization) of the bidder and target cumulative abnormal announcement returns. The lottery index LIDX measures the similarity of the stock of the target with salient features of lottery tickets. LIDX increases in the attractiveness of the target as a gamble. The constituents of LIDX are the price of the target's stock (Price), expected idiosyncratic skewness (EISKEW), and idiosyncratic volatility (IVOLA), all measured at the end of the second month prior to the month of the announcement. The baseline regression is model (5) from Table 3 to 5. The baseline regression is rerun for 8 different subsamples: (i) above or below median RET12 (the cumulative return of the bidder's stock calculated over months $t-13$ to $t-2$ for a takeover announcement in month t), (ii) above or below median Z-Score (Altman's (1968) z-score, as modified by MacKie-Mason (1990)), (iii) above or below median DIFF52 (the ratio of the bidder's stock price at the end of month $t-2$ and the 52 week high over the months $t-13$ to $t-2$ minus one), (iv) negative or positive net income in the last fiscal year before the takeover announcement. See Appendix Table A.1 for a detailed overview of variable definitions. The table reports the coefficient estimates of LIDX and its t-statistic as well as the number of observations in small font size below the estimates. Standard errors are clustered by announcement month.

	Baseline	RET12		Z-Score		DIFF52		Net Income	
Variable	Estimates	High	Low	High	Low	Large	Small	Neg.	Pos.
OPP	27.932	24.934	24.861	13.099	33.826	26.891	23.933	32.154	23.278
	6.00	3.40	3.52	1.37	4.10	4.00	3.22	2.04	4.93
	3,355	1,533	1,512	1,259	1,134	1,564	1,578	479	2,876
ACAR [-1,+1]	-3.161	-0.594	-5.816	-2.202	-5.028	-5.057	-1.182	-8.898	-1.678
	-4.39	-0.54	-5.07	-1.58	-3.65	-4.41	-1.26	-2.94	-2.20
	3,327	1,576	1,557	1,252	1,106	1,559	1,572	445	2,882
TCAR [-1,+1]	10.893	9.273	10.302	6.751	13.229	6.665	13.282	12.940	8.625
	4.30	2.81	2.72	1.43	3.28	1.79	4.20	1.66	3.23
	3,427	1,562	1,551	1,280	1,156	1,589	1,622	481	2,946
Synergy [-1,+1]	-2.228	0.086	-4.718	-2.899	-3.264	-4.705	-0.126	-6.245	-1.729
	-3.12	0.09	-4.18	-2.21	-2.57	-4.19	-0.14	-2.01	-2.34
	3,262	1,541	1,528	1,232	1,080	1,523	1,544	431	2,831

Appendix

TABLE A.1

Variable Definitions and Sources

This table briefly defines the main variables used in the empirical analysis. The data sources are: (i) ARDA: Association of Religion Data Archives, (ii) Compustat, (iii) CRSP: Center for Research on Security Prices, (iv) Andrew Metrick's website: www.som.yale.edu/faculty/am859/data.html, (v) Chicago Fed. Table 2 reports the summary statistics for all these variables.

Variable name	Description	Source
Lottery variables		
LIDX	Stocks are assigned to vigintiles (semi-deciles) by price, idiosyncratic volatility, and expected idiosyncratic skewness (where 20 is the lowest price group and the highest volatility and skewness groups). The price, volatility and skewness vigintile assignments are added for each target to produce a score ranging from 3 to 60, which is then scaled to range from 0 to 1 using (Score-3)/(60-3).	CRSP
EISKEW	Expected idiosyncratic skewness estimated following Boyer, Mitton, and Vorkink (2009). For an announcement in month t, we calculate EISKEW for the three year period ending in month $t-2$.	CRSP
IVOLA	Idiosyncratic volatility (standard deviation) of regression residual using the Fama and French (1993) three-factor model. Residuals are estimated using daily data over a three year period prior ending in month $t-2$ for an announcement in month t.	CRSP
Price	Share price on the last trading day in month $t-2$ before the takeover announcement in month t.	CRSP
Acquiror and target characteristics		
ROA	Bidder (target) firm return on assets (= net income / total assets) from the last fiscal year before the takeover announcement.	Compustat
BM Ratio	Ratio of book value of equity (= stockholders' equity - deferred taxes and investment tax credit - redemption value of preferred stock) to market value of equity (MCAP) the last fiscal year end before the takeover announcement for the bidder (target) firm.	CRSP, Compustat
MCAP	Natural log of Price * Shares outstanding (in millions) at the last fiscal year end before the takeover announcement for the bidder (target) firm.	CRSP
Relative Size	Transaction value over bidders market capitalization at the last fiscal year end before the takeover announcement.	SDC, CRSP
New Economy	1 if the target is a new economy firm. Following Oyer and Scheafer (2005) targets with SIC codes 3570 to 3579, 3663, 3674, 5045, 5961, and 7370 to 7379 are defined as new economy firms.	SDC

(continued...)

TABLE A.1 (Continued)
Variable Definitions and Sources

Variable name	Description	Source
Deal characteristics		
OPP	Offer price premium is defined as the bid price over the target's stock price 4 weeks before the takeover announcement minus 100%.	SDC
A(T)CAR[-1,+1]	3-day cumulative abnormal returns for the bidder (target) firm using the market model. Market model parameters are estimated over days (-230, -31).	CRSP
$ACAR[-1,+1]	3-day cumulative abnormal dollar returns for the bidder firm, defined as ACAR[-1,+1] * AcquirorMCAP[-2] - Toehold * TCAR[-1,+1] * TargetMCAP[-2].	SDC, CRSP
$TCAR[-1,+1]	3-day cumulative abnormal dollar returns for the target firm are defined as TCAR[-1,+1] * TargetMCAP[-2].	CRSP
Synergy[-1,+1]	Percentage synergies calculated as ($ACAR[-1,+1] + $TCAR[-1,+1]) / (AcquirorMCAP[-2] + (1 − Toehold) * TargetMCAP[-2]).	SDC, CRSP
$Synergy[-1,+1]	Dollar synergies are $ACAR[-1,+1] + $TCAR[-1,+1].	SDC, CRSP
Toehold	Percent of shares held by the acquiror at the takeover announcement date.	SDC
Cash	1 for deals financed with cash only.	SDC
Stock	1 for deals financed with stock only.	SDC
Tender	1 for tender offers.	SDC
Hostile	1 for hostile deals.	SDC
Conglomerate	1 where bidder and target are in a different 2-digit SIC code industry.	SDC
Competed	1 for deals with more than one bidder.	SDC
log(Number of Deals)	Natural log of the number of sample transactions in the target's 2-digit SIC code industry in the year of the takeover announcement.	SDC
Completed	1 for completed deals.	SDC
Gambling propensity		
CPRATIO	Ratio of Catholic population to Protestant population in the county where the acquiror headquarter is located.	ARDA, US Census
CFNAI	The CFNAI is a weighted average of 85 existing monthly indicators of US economic activity. It is constructed to have an average value of zero and a standard deviation of one. A positive index corresponds to growth above trend and a negative index corresponds to growth below trend.	Chicago Fed
Managerial discretion variables		
GIM-Index	Following Gompers, Ishii, and Metrick (2003), minimum 1 (low entrenchment), maximum 19 (high entrenchment).	Andrew Metrick's website
PM Competition	Herfindahl index (sum of squared market shares measured in sales) in the acquiror's major 3-digit SIC code industry during the year prior to the takeover announcement.	Compustat

(continued...)

TABLE A.1 (Continued)
Variable Definitions and Sources

Variable name	Description	Source
Variables indicating loss space		
Z-Score	Altman's (1968) z-score, as modified by MacKie-Mason (1990), is defined as [3.3 * (operating income before depreciation - depreciation and amortization) + sales + 1.4 * retained earnings + 1.2 * working capital] / total assets.	Compustat
RET12	Cumulative return of the bidder's stock calculated over the months $t-13$ to $t-2$ for an announcement in month t.	CRSP
DIFF52	Difference of the current stock price of the acquiror to the 52 week high, scaled by the current stock price. The current stock price of the acquiror is the stock price on the last trading day of month $t-2$ prior to the takeover announcement month t. The 52-week high is defined as the highest share price during the 12 months ending on the last trading day of month $t-2$.	CRSP
Net Income	Net income of the bidder reported at last fiscal year end before the announcement.	Compustat