

The Determinants of the Method of Payment in Mergers *

Alberta Di Giuli [†]

ISCTE Business School

Abstract

This paper studies the determinants of the method of payment using a sample of 2,602 U.S. mergers. The empirical specification allows me to separately identify the effects of: (i) the size of the acquirer and target; (ii) the possible market misvaluation of both firms; and (iii) the investment opportunities of the merged entity. I find that sizes of the acquirer and target are positively correlated with the use of cash, while acquirers with high investment opportunities prefer stock-based acquisitions. Finally, results suggest that target misvaluation plays a key role in determining the method of payment in mergers: I find that a 10% increase in the overvaluation of the target leads to a 15% increase in the use of stock, while a 10% increase in the overvaluation of the acquirer leads to only a 4% increase in the use of stock.

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[†] Alberta Di Giuli is from ISCTE Business School, Department of Finance, Address for correspondence: Room D501, Av Forcas Armadas, 1649-026 Lisbon, Portugal, Email: alberta.digiuli@iscte.pt

1. Introduction

This paper examines the determinants of the method of payment in mergers, accounting explicitly for the size and the possible market misvaluation of the acquirer and the target, and for the investment opportunities of the merged entity. Common intuition suggests that target managers should not accept a stock merger if the acquirer is more overvalued than the target. However, the evidence indicates that this is not always the case (see Andrade, Mitchell and Stafford (2001); Dong et al. (2006); and Rhodes-Kropf, Robinson and Viswanathan (2005)). Shleifer and Vishny (2003) (SV) and Rhodes-Kropf and Viswanathan (2004) (R-KV) provide explanations for this empirical puzzle. In SV, opportunistic target managers accept the overvalued stock of the acquirer because they can profit from cashing out quickly after the merger is completed. In R-KV, the interests of target managers are aligned with those of shareholders, but target managers accept overvalued stock because they overestimate takeover synergies.

The empirical literature examines the relationship between overvaluation and method of payment in mergers mainly comparing Tobin's Q and other proxies for market-to-book values of the target with those of the acquirer. However, the use of Tobin's Q in this context seems debatable because any measure of price-to-book can be interpreted simultaneously as a proxy for misvaluation as well as for investment opportunities.

Another empirical issue that arises in this context relates to the effect of the size of acquirer and target on the method of payment. The literature usually analyzes the impact of firm

sizes through the ratio of the market value of the target to that of the acquirer, i.e. relative size.¹ This methodology creates further problems because: (1) the use of ratios does not separate the effect of target value (numerator) from that of the acquirer value (denominator); (2) the use of market values in the ratio partially reflects the relative overvaluation of the two entities rather than being purely a measure of relative size.

I address these methodological issues by avoiding the use of ratios and hence of Tobin's Q and relative size. Tobin's Q is replaced by the book and market values of the assets of each firm. Similarly, relative size is replaced by the book values of the assets of each firm. In this way, the effect of each of the above variables can be clearly identified and, since I use book values, the measure of size is not affected by misvaluation. To disentangle the effect of investment opportunities from that of market misvaluation, I use the average capital expenditures in the four years after the merger, as a proxy for the investment opportunities of the combined entity. As actual investments are strongly correlated with planned investments (Lamont (2000)), post-merger investments can be expected to reflect pre-merger planned investments. Controlling for the investment opportunities of the merged entity, and the book values of the assets of the target and acquirer, the market values of the assets of each firm should proxy for misvaluation. To check the robustness of this specification, I use other proxies for misvaluation, such as discretionary accruals (Polk and Sapienza (forthcoming)) and the dispersion of analysts forecasts of earnings per share (Gilchrist, Himmelberg, and Huberman (2005)).

I examine a sample of 2,602 mergers among US public firms completed between 1984 and 2005. The findings show that target overvaluation is significantly positively correlated with

¹ Some studies also control for the book value of the acquirer assets (Faccio and Masulis (2005)), while others use mainly market measures to proxy for size: Dong et al. (2006) in their logistic regression, use the relative size and the log of the market value of the target; Baker, Coval, and Stein (2007) use the market value of both the target and the acquirer.

the use of stock. When the market overvaluation of the target increases by 10%, the percentage of stock employed in the deal rises by roughly 15%. These results suggest that target managers use their bargaining power to exchange shares only when their stock is overvalued. These findings are in line with the theory of RK-V because they suggest that target managers care about shareholders value. On the other hand, acquirer overvaluation has a weaker effect on the method of payment. In my benchmark specification, I find that a 10% increase in the market overvaluation of the acquirer would increase the percentage of stock used in the acquisition by roughly 4%.

The stronger effect of the target overvaluation as opposed to that of the acquirer indicates that acquiring managers are relatively more willing to accept overvalued stock than target managers. This provides indirect support to the “hubris” hypothesis of Roll (1986). According to this theory, managers benefit from building empires via acquisitions of other firms. Therefore, they sacrifice the welfare of their shareholders by accepting the overvalued shares of the target in order to increase the size of the firm under their control.

I also find that firms with better growth opportunities are more inclined to use stock as a method of payment. According to my estimates, a 10% increase in the average capital expenditures increases the fraction of stock used by roughly 5%. Acquirers with high growth opportunities use less cash for a merger, so that they have more liquidity after the merger to finance new investments.

The size of the acquirer and target is positively correlated with the use of cash. A possible explanation of these effects is that larger acquirers have a higher borrowing capacity and are more diversified, thus facing lower bankruptcy costs. Moreover, acquiring a larger target allows the acquirer to become more diversified and have better collateral, and hence, to have greater

borrowing capacity. An alternative explanation is that the use of stock leaves the stockholders of a large target in control of a large fraction of the merged entity.

One might wonder why a firm with high investment opportunities would choose a stock merger rather than a cash merger *plus* an equity issue to finance the new investments. Previous studies predict that a stock merger is preferable to a cash merger followed by an equity issue because of investor inertia (see Baker, Coval and Stein (2007)). Consistent with this investor's inertia hypothesis, in my sample I find no positive correlation between cash mergers and equity issues. On the other hand, there is a positive correlation between equity issues (pre- and post-merger) and the percentage of stock used as a method of payment by acquirers, indicating that these acquirers may be exploiting their overvalued stock.

The paper is structured as follows. Section 2 presents theories and evidence on the drivers of the method of payment in mergers. Section 3 describes data and the empirical method. Section 4 presents and discusses the results and Section 5 concludes.

2. Theories and evidence on the effect of size, market misvaluation, and investment opportunities on method of payment

2.1 Size

The size of both the acquirer and the target should impact the choice of method of payment in mergers. A firm with a high level of assets, especially tangible assets, should be able to borrow more. Furthermore, larger firms are usually more diversified, and hence should have a lower probability of bankruptcy at a given leverage ratio, and thus greater debt capacity. This should lead to a positive correlation between acquirer size and use of cash in mergers.

The same reasoning can be applied to the size of the target: a larger target can be seen as better collateral. Hence, target size should be positively correlated with the acquirer's ability to borrow. Furthermore, larger targets allow acquirers to achieve a higher level of diversification. Finally, acquiring a large target using stock results in target shareholders controlling a large fraction of the merged entity's equity. Hence, the size of the target should be positively correlated with the use of cash.

The literature has controlled for acquirer size *and* target size using, mainly, the ratio of target market value over acquirer market value, i.e., controlling for the "relative size" of the target², a measure that can be interpreted as the relative overvaluation of the target and the acquirer. Faccio and Masulis (2005) use the book value of acquirer assets as a measure of size (together with the relative size) and find a positive correlation between this variable and the percentage of cash used in the merger. Dong et al. (2006) use relative size and the log of target market value in logistic regressions and find that the market value of the target is positively correlated with the probability of using stock. Finally, Baker, Coval and Stein (2007) use the market value of the target, which they find to be negatively correlated with the probability of using stock, and the market value of the acquirer, which they find positively correlated with the probability of using stock.

² This is usually positively correlated with the use of stock as a method of payment.

2.2 Market misvaluation

Two recent papers, Shleifer and Vishny (2003) (SV), and Rhodes-Kropf and Viswanathan (2004) (R-KV) propose theories on how market misvaluation affects merger activity and, in particular, the method of payment.

In SV, acquiring managers use their overvalued stock to buy targets that are either less overvalued (than the acquiring) or undervalued, and they use cash only if the target is undervalued. In this model, target undervaluation is a necessary, but not sufficient, condition for cash mergers. While bidder managers try to maximize long term shareholder value, target managers are opportunistic: they have short term goals and agree to sell their less-overvalued firms for stock to cash out quickly after the merger.

R-KV proposes instead a model in which misvaluation has two components: a firm-specific component and a sector/market one. As in SV, acquirer managers use their overvalued stock to buy less overvalued targets in order to maximize long term value for their shareholders. Contrary to SV, in R-KV, target managers care about long-term shareholder value; they may know that both the bidder and the target are overvalued, but they overestimate the synergies, because the error in valuing takeover synergies is correlated with overall valuation error. This is why target managers agree to sell their firms for stock even if their stock is less overvalued than the bidder's stock. In contrast to SV, in R-KV cash targets can be overvalued (although they must be less overvalued than the acquirer) when high synergies outweigh the overvaluation.

The empirical predictions of the two models with respect to the effect of market misvaluation on the method of payment are similar:

- 1) Overvalued firms use stock to buy relatively undervalued firms when both firms are overvalued.
- 2) Cash targets are more undervalued than stock targets.
- 3) Cash acquirers are less overvalued than stock acquirers.

In both the SV and R-KV models, there is no room for hubris theories of takeovers (Roll, 1986). In both models, acquirer managers are not overconfident, and they pursue long-term gains. However, Malmendier and Tate (forthcoming) find that overconfident CEOs overestimate their own ability to generate post-merger returns, overpay for targets and make value-destroying mergers. If bidder managers are overconfident, market valuation should matter less, because overconfident managers would not perceive their firms as overvalued by the market. In this case, target preferences would probably be of primary importance.

SV presents several findings from previous studies to support their model. Among others, Verter (2002) shows that there is a higher level of merger activity in high-valuation markets. Andrade, Mitchell, and Stafford (2001) provide evidence that stock-based acquisitions are predominant in high-valuation markets, and that in 66% of mergers between 1973 and 1998, the acquirer's Tobin's Q is higher than that of the target.

Similarly, Dong et al. (2006), analyzing takeovers between 1978 and 2000, find that: 1) bidder valuation ratios (price-to-book, P/B, and price-to-value, P/V) are higher on average than those of the target; 2) bidder-target differences in valuation are on average greater among stock mergers than among cash mergers; 3) stock mergers are characterized by higher bidder and target valuations than are cash mergers; 4) stock is more likely to be used as a method of payment when the target has a higher valuation; and 5) bidders with higher valuations are more likely to use stock as the means of payment. However, as Dong et al. (2006) underline, their valuation

measures (P/B and P/V) are affected simultaneously by market misvaluation and investment opportunities measures, and it is difficult to disentangle which effect they actually represent.

A recent article by Rhodes-Kropf, Robinson and Viswanathan (2005) uses a different empirical approach in its analysis of the effect of market misvaluation and investment opportunities on merger waves. In order to test how market mispricing affects merger activity, these authors decompose the market-to-book ratio (M/B) into three components: 1) firm-specific pricing deviation from short-run industry pricing (firm specific misvaluation); 2) sector-wide, short-run deviations from firms' long-run pricing (sector misvaluation); and 3) long-run pricing to book (growth opportunities). The first component represents the difference between the market value of the firm and its time-t fundamental value; the second is the difference between the firm's time-t fundamental value and its long run value; and the third component is the difference between the firm's long run value and its book value.

Using the difference between the log of the market value and the log of the book value of firms (the market-to-book ratio), Rhodes-Kropf, Robinson and Viswanathan (2005) find that acquirers in cash mergers are less overvalued than those involved in stock mergers. Targets are undervalued in cash mergers, while slightly overvalued in stock mergers. These findings remain true when the authors use their measure of firm-specific misvaluation.

Furthermore, Rhodes-Kropf, Robinson and Viswanathan (2005) find that the probability that an acquisition is made with stock is positively correlated with the overvaluation of the firms involved in the merger, whether targets or acquirers (the authors do *not* study separately the effects of acquirer and target overvaluation). Results are similar when Rhodes-Kropf, Robinson and Viswanathan (2005) use as dependent variable the total number of stock mergers in a specific

industry in a year (there is a positive correlation between the number of mergers and the misvaluation measures).

2.3 Investment opportunities

Firms with high investment opportunities should be more willing to use stock as a means of payment since they would be less inclined to increase leverage (see Myers (1977)), and they might prefer to save their cash to avoid being liquidity constrained after the merger.

Martin (1996) was the first to analyze the effect of investment opportunities, measured with Tobin's Q, on the method of payment in mergers. This author finds a positive correlation between Tobin's Q and the use of stock as a method of payment. Dong et al. (2006), among others, find a positive correlation between the acquirer's price-to-book value of equity (P/B), and the use of stock as a method of payment. However they underline that the P/B, as well as other proxies for market-to-book values (like Tobin's Q), can be interpreted as both market misvaluation and investment opportunities.

3. Empirical analysis

3.1 Data and descriptive statistics

The sample used in this paper includes all completed deals among public US acquirers and targets between January 1984 and December 2005. I exclude financial and real estate companies (target or acquirer), and I require availability of the acquirer's assets either in the year *before*, the year *of*, or the year *after* merger. This results in a sample of 2,602 deals. Data on

mergers are from SDC Platinum, accounting data are from Compustat, stock prices are from CRSP, and analyst forecasts are from I/B/E/S.

Following Faccio and Masulis (2005), who analyze European M&A deals, I use a continuous measure of the method of payment instead of dummy variables (cash vs. stock vs. mixed), which gives a better measurement of the method of payment, since mixed mergers represent a considerable proportion of deals (27.7%), and they are characterized by marked differences in the percentage of cash used. Acquirers use on average 50.9% stock, 36.3% cash, and 12.8% “other.”

As a measure of the method of payment in mergers, I employ the fraction of stock used in each deal (*Stock*). The rest of the payment is almost entirely made in cash. In fact, I restrict my analysis to deals in which the fraction of “other” (as classified by SDC) is at most 5%³. “Other” consists mainly of non-contingent liabilities and newly issued notes.

Table I reports all proxies used in the study. The methods followed to measure the Kaplan and Zingales (1997) index, the discretionary accruals and the dispersion of analyst EPS forecasts is given in the appendix.

Add Table I here

In addition to the market values of assets and the equity of acquirers and targets, I use two recently proposed measures of mispricing: discretionary accruals (see Polk and Sapienza (forthcoming)), and dispersion of analyst earnings forecasts (see Gilchrist, Himmelberg and Huberman (2005); and Diether, Malloy, and Scherbina (2002)).

³ Results do not change if deals with any percentage of “other” are excluded, or if all of them are included as cash deals.

Polk and Sapienza (forthcoming) claim that firms with high discretionary accruals have relatively low future stock returns, implying that they are overpriced. Hence, discretionary accruals could be used as a measure of firm overvaluation. On the other hand, the use of the dispersion of analyst earnings forecasts as a measure of mispricing is based on the idea that dispersion of investor opinions, together with short-sale constraints, causes overvaluation. Empirically, Diether, Malloy, and Scherbina (2002) find that high-dispersion stocks have abnormally low future returns.

I use average capital expenditures in the four years post-merger as a proxy for investment opportunities; that is, I assume that managers have rational expectations about their investment opportunities⁴. Empirically, Lamont (2000) finds that there is a strong link between planned and actual investments. He finds that more than three-quarters of the variation in aggregate investments in a year can be forecast at the beginning of that year, using managers' investment plans. The variation in expected investments represents a large part of the variation in actual investments. Hence, most of this year's investments were already decided last year by managers. Therefore, actual investments should serve as a good proxy for planned investments. In the merger context, *actual* post-merger investment should be correlated with the investments that managers *planned* to make after the merger, thus mirroring the investment opportunities of the newly merged entity.

⁴ For deals in which the capital expenditures are not available in the four years after the merger, I use the average of the capital expenditures available. However, if I restrict the analysis to the companies for which I have four years of capital expenditures, results do not change.

I use realized capital expenditures as a proxy for planned investments instead of total investments, since Dong et al. (2007) underline that research and development expenses are influenced more than the capital expenditures by market misvaluation of the firm⁵.

Table II presents the mean and median (in italics) of the variables used. All variables are in 2005 dollars and are winsorized at the 1st and 99th percentiles.

Add Table II here

The data I analyze have similar statistics to the data used by Andrade, Mitchell, and Stafford (2001), Rhodes-Kropf, Robinson and Viswanathan (2005), and Dong et al. (2006)⁶. In the period 2001–2005 (a period not covered by earlier studies), the average amount of stock used in deals decreased from 50.9% to 48.0%, while the percentage of cash increased from 36.3% to 45.7%, and the percentage of “other” decreased from 12.8% to 6.3%.

3.2 The statistical model

I use levels instead of ratios as regressors to better understand the effect of size, market valuation, and investment opportunities on the choice of method of payment. All other specifications that use ratios, or ratios plus levels are more restrictive or equivalent to the one adopted here.

⁵ However, results are similar if I use research and development expenses.

⁶ There are some small differences in the data used in these papers since they consider slightly different time periods. Rhodes-Kropf, Robinson and Viswanathan (2005) analyze deals between 1977 and 2000; Dong et al. (2006) between 1978 and 2000; and Andrade, Mitchell, and Stafford (2001) between 1973 and 1998. Furthermore, Dong et al. (2006) consider only those deals in which the value of the transaction is at least \$10 million, while in Rhodes-Kropf, Robinson and Viswanathan (2005) observations are required to have book-to-market ratios below 100 and market equity larger than \$10 million.

The statistical model has the following specification (I omit time and merger subscripts):

$$y = \alpha_0 + \alpha_1 \textit{Acquirer Size} + \alpha_2 \textit{Target Size} + \alpha_3 \textit{Acquirer Market Misvaluation} + \\ \alpha_4 \textit{Target Market Misvaluation} + \alpha_5 \textit{Merged Entity Investment Opportunities} + \\ \alpha_6 \textit{Acquirer Liquidity Constraints} + u$$

where $y = \log\left(\frac{z}{1-z} + \varepsilon\right) \in (-\infty, +\infty)$,

$z = \textit{Stock}$ (fraction of stock used in the merger), and ε^7 is a small number.⁸

The independent variables and proxies are defined in Table I. All regressions include industry- and time-fixed effects.

I make a logistic transformation of the variable z , the fraction of stock used, in order to run an OLS regression which takes into account the different percentages of cash and stock used in mixed mergers. However, the multinomial logit regression shows similar results (see appendix)⁹.

⁷ The choice of ε does not affect my results. Regressions run with different ε show similar results in terms of significance of the coefficients.

⁸ In their analysis of European mergers, Faccio and Masulis (2005) use a two-boundaries Tobit estimation. However the variable z has its natural boundaries in 0 and 1, but it is not censored. Nonetheless my results still hold if I use a Tobit estimation.

⁹ Results for the stock vs cash mergers are similar to the ones found with the OLS regression. Interpreting the results related to the mixed mergers is difficult (given that those mergers are characterized by different percentages of cash and stock used), however they seem in line with the ones of the OLS regression.

4. Results

This section sets forth the empirical results. I present and discuss separately the effect of size (Section 4.1), market misvaluation (Section 4.2), investment opportunities (Section 4.3), and liquidity constraints (Section 4.4). In Section 4.5, I analyze the issue of endogeneity and reverse causality between my proxy for investment opportunities (the level of capital expenditures after a merger) and the method of payment. Finally, in Section 4.6, I analyze equity issues around mergers and their correlation with method of payment.

4.1 Size

Table III reports the effect on the method of payment of the acquirer's and the target's size, market (mis)valuation, and liquidity constraints. In column 1, I focus on the impact of market and book value of assets, while in columns 2, 3, and 4, I use other measures of market values (column 2) and size (columns 2, 3, 4). In columns 5, 6 and 7, I add measures of liquidity constraints.

An acquirer book value is significantly negatively correlated with the use of stock in all regressions (columns 1, 5, 6, 7). Controlling for the book value of the target's assets and for the market value of the acquirer's and target's assets, a 10% increase in the book value of the acquirer's assets would decrease the fraction of stock used by approximately 9% (Table III,

column 1)¹⁰. The coefficient of the acquirer book value does not change significantly if I introduce different measures of liquidity constraints in the regressions (columns 5, 6, 7) or when I control for the investment opportunities of the merged entity (Table V, column 1 and 2).

Furthermore, the results do not change if, instead of the book value of the assets, I use the book value of common equity (Table III, column 2), sales (column 3), or the number of employees (column 4) as a proxy for size. In all specifications, size is negatively correlated with the use of stock as payment, although each of the three alternative proxies delivers a smaller coefficient (and a smaller impact) on the method of payment.

One possible explanation for the negative correlation between the acquirer's size and the use of stock is suggested by Faccio and Lang (2005) in their analysis of European M&A deals—larger acquirers might have greater capacity to borrow, and they are typically more diversified, thus having lower bankruptcy costs.

The book value of the target's assets is also negatively correlated with the use of stock as payment. A 10% increase in the book value of the target's assets would decrease the fraction of stock used by roughly 8% (Table III, column 1). The coefficient of the target's book value of assets does not change significantly when I control for liquidity constraints (columns 5, 6 and 7). Similar results are obtained when the value of common equity (Table III, column 2), of sales (column 3), or of the number of employees (column 4) are used as proxies for size. Again, all

¹⁰ All the effects of the changes in the independent variables on the method of payment in mergers are measured at the mean value of the z (mean value = 0.58), the percentage of stock used in the merger. Alternatively I could have used the median value of z (0.99). z presents most of the observation at the boundaries of the distribution (0 and 1). However, a considerable amount of the deals are mixed mergers (see Data Section). Using a continuous measure of z would allow the study of mixed mergers. An analysis of the impact of the independent variables using a value of z close to the boundaries of the distribution would be less interesting: when choosing a value of stock close to the boundaries, the effect on every change in the independent variable would, in any case, have little effect on z . Firms that instead have decided to use a mixed method of payment (and hence that are not on the boundaries of the distribution) would have more options regarding the percentage of stock to be used, and, hence, how to operate within the distribution of z . Furthermore, one of the most important findings of this paper is the higher effect of market misvaluation of the target vs. that of the acquirer with respect to method of payment. This different effects hold whatever value of z I choose when measuring the impact of the independent variables on z .

proxies for target size are significantly negatively correlated with the use of stock and, as before, the three other alternative proxies for the book value of assets show smaller coefficients (and a smaller economic impact) on the method of payment.

The negative correlation between the target's size and the method of payment might be explained using the same reasoning presented above for the impact of the acquirer's size; that is, acquiring a larger target allows the acquirer to become more diversified and to have better collateral, and consequently, to have more borrowing capacity. An alternative explanation is that the use of stock would leave the stockholders of a large target in control of a large fraction of the merged entity.

Add Table III here

4.2 Market misvaluation

Tables III, IV and V show the impact of market (mis)valuation of the acquirer and the target on the method of payment.

In the regressions, instead of Tobin's Q, I use the log of the market value of assets and the log of the book value of assets. Thus I introduce separately the numerator and the denominator of Tobin's Q, avoiding the problem related to the use of ratios. However, when interpreting the coefficient of market value, I incur the same problem of interpretation as when one uses Tobin's Q. The market value, even after controlling for book value, can represent both investment opportunities and market misvaluation of a firm. Introducing the post-merger investments as a proxy for investment opportunities (Table V), allows the interpretation of market values as a measure of market misvaluation.

In Table III, I analyze the effect on the method of payment of size (book value of assets) , and market (mis)valuation (market value of assets) of the acquirer and target. A 10% increase in market value of the target's assets would increase the fraction of stock used by roughly 14% (Table III, column 1). The market value of assets remains significant when I control for various measures of liquidity constraint (columns 5, 6, 7), and remains significant, although with a slightly smaller coefficient, when alternatives to the book value of assets are used as proxies for size (columns 3 and 4).

Furthermore, the results do not change when I use the market value of common equity instead of assets. Finally, in the benchmark specification, when controlling for the investment opportunities of the merged entity, the coefficient of the market value of the target's assets is still significant, and the economic impact of this variable is even higher than in previous specifications: a 10% increase in the market value of the target's assets would increase the fraction of stock used by roughly 15% (Table V, column 1).

These findings show that the higher is the target's misvaluation, the higher is the level of stock used in the merger; i.e., the willingness of target managers to accept stock is positively correlated with market overvaluation of their company. This suggests that target manager resistance to stock mergers plays a key role in the choice of the form of payment.

These findings could also be interpreted as the results of acquirer behavior; i.e., the acquiring managers would prefer to use a higher fraction of stock as a means of payment in case of an overvalued target. However, this seems unreasonable, as the acquirer would not only overpay for the target (as it would in the case of a cash merger) but it would also acquiesce to the transfer of part of the control structure to the target shareholders for free.

The dispersion of analyst forecasts, another possible measure of mispricing, also has a positive coefficient, but is significant only at the 10% level. On the other hand, discretionary accruals appear with the wrong sign, although they are significant only at the 10% level.

In contrast to that of the target's market, the acquirer's market misvaluation is not significant in all specifications. The market value of the assets is significant and positively correlated with the use of stock only when controlling for liquidity constraints (Table III, regression 7). Hence, acquiring managers seem to be willing to use stock in response to (excess) market valuation of their shares only when they have cash flow shortages. In the benchmark specification, when controlling for investment opportunities (Table V, column 1), an increase in the market value of the acquirer by 10% would increase the fraction of stock used by roughly 4%. Finally, the dispersion of analyst forecasts of the acquirer and discretionary accruals are not statistically significant¹¹.

Even when the market valuation of the acquirer is statistically significant, its effect on the method of payment is weaker than that of the target. In the benchmark specification (Table V, column 1) an increase of the market value of the target by 10% would increase the fraction of stock used by roughly 15%, while the same magnitude of increase in the acquirer's value would increase the fraction of stock used by only 4%.

Add Tables IV and V here

¹¹ In table IV the book value of the acquirer is not significant and the book value of the target shows a positive sign. This is probably due to the fact that the number of observations drops significantly. It might also be caused by the fact that the dispersion of the EPS forecasts and the discretionary accruals are not good measures of mispricing, that is, I am not controlling for the market misvaluation.

In summary, the higher is the target market misvaluation, the higher is the percentage of stock used in the merger; the higher the acquirer's market misvaluation, the higher the percentage of stock used in the merger. (However, this result holds only for some specifications.) Also, the economic effect of market overvaluation seems to be stronger in the case of the target than of the acquirer.

Baker, Coval and Stein (2007) also find a significant and positive correlation between the market value of the target and the use of stock as the method of payment (measured with a dummy variable stock = 1, cash = 0). Interestingly, the authors find that the market value of the acquirer is negatively correlated with the probability of doing an equity merger. The authors control for the market-to-book ratio of the target and of the acquirer, but unlike this study, they do not control for the book value of the acquirer and the target. Hence, in Baker, Coval and Stein (2007), the market value of the acquirer can be interpreted, as the authors do, as a proxy for size rather than market (mis)valuation.

Dong et al. (2006), however, find a negative and significant correlation between the target's market value of equity and the use of stock for payment (measured again by a dummy variable). These authors control for the market-to-book ratio of the target and the acquirer, and for the relative size (market value of the acquirer's equity over the market value of the target's equity), but they do not control for the market value or the book value of the acquirer. nor for the book value of the target. The market value of the target in Dong et al. (2006) can be considered as a proxy for size, given that the authors do not control for the book values of the target's assets.¹²

¹² Dong et al. (2006) also run another regression where the dependent variable is the use of cash (dummy variable cash = 1 and stock = 0). The results are *not* the opposite of the ones found by the authors when the dependent variable is stock = 1, cash = 0, because mixed mergers are defined as zero in both cases. When the authors use cash = 1 as a dependent variable, the market value of the target is no longer significant. These different findings underline the importance of using a continuous measure of the method of payment.

RK-V and SV predict that: 1) overvalued firms use stock to buy relatively undervalued firms when both firms are overvalued; 2) cash targets are more undervalued than stock targets; and 3) cash acquirers are less overvalued than stock acquirers.

In this paper, I do not test the first prediction, which could in principle be tested comparing the average overvaluation (measured through market-to-book ratios, as in Dong et al. (2006), or through the differences between the log of market values and the log of book values, as in RK-V) of the target and the acquirer in cash and stock mergers. I prefer to analyze the effects of market and book values separately.

On the other hand, the results seem to confirm the second prediction of the RK-V and SV models. Specifically, the resistance of undervalued targets to stock-based acquisition seems to be an important factor in the choice of payment method. In this sense, the findings are more in line with the RK-V model, in which target managers try to maximize their shareholders' value, than with the SV model, in which target managers are opportunistic and do not care about their shareholders' welfare. However, in RK-V, target managers are then fooled by their own synergy valuations. The results of this study show weak support for the third prediction, or more exactly, its effect seems to be less strong than the effect of the second prediction.

4.3 Investment opportunities

Table V displays the effect of investment opportunities on the method of payment. As expected, the proxy for investment opportunities, the post-merger level of capital expenditures, is strongly and positively correlated with the use of stock as a method of payment. In the

benchmark model, an increase in the average capital expenditures of the merged entity by 10% would increase the fraction of stock used by roughly 5% (Table V, column 1).

The effect of capital expenditures is separated from that of research and development expenses with regard to the method of payment. It is sometimes argued that research and development expenses are more affected by market misvaluation than the capital expenditures (see Dong et al. (2007)). However, my results show that research and development expenses are also positively and significantly correlated with the use of stock as a method of payment, and that their effect seems similar to that of capital expenditures.

In their analysis of discretionary accruals, misvaluation and investments, Polk and Sapienza (forthcoming) claim that investment decisions are affected by market misvaluation. If investors have short time horizons, managers will overinvest to boost their stock price.¹³ Hence, short-horizon managers temporarily alter investment choices and misallocate resources.¹⁴ They find evidence that there is a positive correlation between a firm's investment and its discretionary accruals, i.e., their proxy for mispricing.

However, the correlation between post-merger investment and the use of stock as method of payment found in this paper should not be attributable to mispricing. The time horizon analyzed is four years, and Polk and Sapienza (forthcoming) claim that short-horizon managers *temporarily* overinvest. A four year overinvestment strategy to boost the firm's stock price seems unreasonable. Furthermore, if the merger has been made with stock because the firm is already overvalued, it does not make sense for the manager to overinvest after the merger; he has already exploited market misvaluation through a stock merger (although in this case it might be claimed

¹³ Baker, Stein and Wurgler (2003); and Chirinko and Schaller (2001) claim that investor sentiment has an impact on real investment. Managers time the market, issuing equity when the firm's stock is overpriced.

¹⁴ Results are consistent with Stein's (1996) model on how stock price deviation from fundamentals affects real investment choices for a firm.

that the firm can continue to exploit the market with several mergers and/or subsequent equity issues). The same observation applies to the dispersion of analyst EPS forecasts, the other proxy used for market misvaluation.

4.4 Liquidity constraints

Among the proxies that this paper uses for liquidity constraints, the levels of debt, cash, and the Kaplan and Zingales' (1997) index (both in its complete and reduced form) are all not significant¹⁵. Only cash flows are significant, and they are negatively correlated with the use of stock as a method of payment (consistent with Martin (1996)). Firms with large cash flows are more inclined to use cash as a method of payment.

4.5 Endogeneity issues

This section examines the issue of endogeneity and reverse causality. It might be argued that method of payment drives the level of post-merger investment, rather than investment opportunities affecting the choice between cash and stock merger.

I use instrumental variable regression to isolate the effect of post-merger investment from other sources of variation. I discuss the validity of the instruments I use for investment opportunity, and then I describe the results of the 2SLS.

I use the median of capital expenditures during the four years post-merger of firms in the same industry (2 digits) as an instrument for those firms' investment opportunities ($\log(\text{Median}$

¹⁵ Martin (1996) and Dong et al. (2006) and Baker, Coval, and Stein (2007) also do not find leverage significant, while Faccio and Masulis (2005) find the variable significantly negatively correlated with the use of cash.

of the Industry Investment $_{t, t+4}$)). A firm that belongs to an industry with high investment opportunities (growth opportunities) should have high investment opportunities too. The median of investments in an industry should be an exogenous measure of investment opportunities; it will be correlated with the level of investment of the specific firm that belongs to that industry, but it has no plausible impact on the method of payment in the merger of any specific firm, other than through the effect on the investment opportunities of the specific firm.

Results from the 2SLS regression confirm the findings of the OLS regression. Column 1 of Table VI (first step of the 2SLS) shows that the *Median of the Industry Investment $_{t, t+4}$* is strongly correlated with the capital expenditures of the post-merger entity. Results confirm that the book values of the acquirer and target (measures of size) are negatively and significantly correlated with the fraction of stock used in the merger, while the market value is positively and significantly correlated with the use of stock. Finally the market value of the acquirer is no more significant and cash flows are negatively and significantly correlated with the use of stock as payment.

Add Table VI here

4.6 Equity issues around mergers

Although I have found that investment opportunities causes acquirers to use stock, an acquirer could decide instead to pay cash and issue equity to finance the new investments. Baker, Coval and Stein (2007) study inertial behavior of investors and how this impacts mergers. The authors argue that inertial behavior improves the terms for the bidder in a stock merger, because

the acquirer's investors, independently on their beliefs, do not resell their shares. In the presence of a downward sloping demand curve, this leads to a reduction in price pressure, and hence to cheaper equity financing.

Baker, Coval and Stein (2007) estimate that roughly 80% of individuals behave as sleepers and accept the shares they are given in a merger. For institutions, the estimated fraction of sleepers is significantly smaller, around 30%. Consistent with their model, these authors find a negative relationship between target institutional ownership and the probability that the merger is made with stock. These authors also discuss an example involving a firm with an exogenously specified growth strategy that over the next year will do one acquisition, and one major new investment. They assume that because of optimal capital structure considerations, one of these two transactions needs to be financed with equity; i.e., either the merger has to be done with stock or the investment has to be financed with an SEO.

Given that the SEO requires an active purchase of the firm's shares, it would be associated with a negative price impact, and therefore tends to be less attractive than a stock merger which benefits from investor inertia. For this reason, Baker, Coval and Stein (2007) argue that a stock merger dominates a cash merger followed by an SEO. Hence, based on the Baker, Coval and Stein (2007) model and findings, I expect firms to prefer a stock merger rather than a cash merger plus an equity issue.

I investigate empirically whether the use of cash in a merger as a consideration is correlated with pre- or post-merger equity issues (in order to finance investments). I find a negative correlation between the use of cash and equity issues (see Table VII). Hence, cash mergers are associated with lower pre- and post-merger equity issues than stock mergers. These

findings are consistent with Baker, Coval and Stein (2007); that is, there is no evidence of a higher level of equity issues in cash mergers than in stock mergers.

Add Table VII here

As a final step in the analysis of mergers, method of payment, and equity issues, I analyze the level of investment in cash and stock mergers separately. I divide firms that use at least 50% of cash in a merger (“cash acquirer”) into “high equity issue firms” (firms that issue equity above median among cash acquirers in the year after the merger) and “low equity issue firms.” High equity issue firms do not have a significantly different level of investment post-merger compared to low equity issue firms. Again, there is no evidence of firms that make cash mergers and then issue equity to finance investments.

On the other hand, I divide firms that use at least 50% of stock in a merger (“stock acquirers”), into “high equity issue firms” (firms that issue equity above the median among stock acquirers in the year after the merger) and “low equity issue firms.” *Low* equity issue firms have a *higher* statistically significant level of investment post-merger than *high* equity issue firms. Low equity issue firms more likely to make a stock merger mainly because of investment opportunities, while the high equity issue firms, which use stock in mergers and do not invest after the merger, might be the firms that make stock mergers primarily because they are overvalued.

Add Table VIII here

5. Conclusions

This paper examines the determinants of method of payment in mergers. Specifically, it estimates the effects on method of payment of market misvaluation and size of the acquirer and target, and of the investment opportunities of the merged entity. Unlike most previous studies, this paper uses a flexible empirical specification that allows identification of the individual effects of the above-mentioned variables. Several proxies for each variable are used to control for the robustness of the results.

The main findings are:

- There is a positive correlation between target and acquirer overvaluation and the use of stock. However, the effect of target overvaluation on the method of payment seems to be stronger than that of the acquirer.
- The investment opportunities of the merged entity also drive the method of payment: firms with high (internal) growth opportunities prefer to use stock as a method of payment.
- The size of the acquirer and the target are positively correlated with the fraction of cash used in a merger.

Although the overvaluation of the acquirer affects the method of payment, it is the target's overvaluation that is most important in the choice of the means of payment. Acquirer managers seem more willing to use their stock to buy overvalued equity than target managers are willing to accept overvalued equity as a method of payment. Hence, target managers maximize shareholder value, while acquirer managers seem to care less about the over/undervaluation of their firms. The behavior of acquirer managers provides indirect support to the "hubris" hypothesis of Roll (1986); such managers sacrifice the welfare of their shareholders by accepting the overvalued

equity of the target as means of payment, so that they can increase the size of the firm under their control. Results are similar using the dispersion of analyst EPS forecasts as a proxy for mispricing (see Gilchrist, Himmelberg, and Huberman (2005); and Diether, Malloy, and Scherbina (2002)); if anything it is the target misvaluation that matters.

My findings contribute to an ongoing debate about the effects of (mis)valuation on firm financial choices. A further step in the analysis of the various effects of target and acquirer overvaluation on method of payment would be to control for the existence of overlapping ownership in the two firms¹⁶—acquirer shareholders that own a large portion of the target equity might be more willing to accept the target overvalued stock as the method of payment.

¹⁶ Regarding the importance of overlapping institutional shareholder in mergers see Matvos and Ostrovsky (2006).

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Tables

Table I

Variables used in the analyses

All variables are measured in the year prior to merger, except for investment opportunities proxies (measured in the four years after the merger), and the dispersion of analyst forecasts (measured in the year of announcement).

Variable	Proxy	Description
Size of the acquirer and target	<i>Acquirer Assets</i> <small>Book Value, t-1,</small>	Book values of assets (Compustat item 6)
	<i>Target Assets</i> <small>Book Value, t-1,</small>	
	<i>Acquirer Equity</i> <small>Book Value, t-1,</small>	Book value of common equity (item 60)
	<i>Target Equity</i> <small>Book Value, t-1</small>	
	<i>Acquirer Sales</i> <small>t-1,</small>	Sales (item 12)
	<i>Target Sales</i> <small>t-1</small>	
	<i>Acquirer Employees</i> <small>t-1,</small>	Employee (item 29)
Market (mis)valuation of the acquirer and target	<i>Acquirer Assets</i> <small>Market Value, t-1</small>	Market value of the assets
	<i>Target Assets</i> <small>Market Value, t-1</small>	(Book value of assets (item 6), plus the market value of common equity (number of common stocks times market price (from CRSP)), less the sum of the book value of common equity (item 60) and balance sheet deferred taxes (item 74))
	<i>Acquirer Equity</i> <small>Market Value, t-1</small>	Market value of common equity (see above)
	<i>Target Equity</i> <small>Market Value, t-1</small>	
	<i>Dispersion of Acquirer EPS Forecasts</i> <small>t-1</small>	Dispersion of analyst EPS forecasts (see appendix)
	<i>Dispersion of Target EPS Forecasts</i> <small>t-1</small>	
	<i>Acquirer Discretionary Accruals</i> <small>t-1</small>	Discretionary accruals (see appendix)
Investment opportunities of the merged entity	<i>Merged Entity CAPX</i> <small>t, t+4</small>	Average capital expenditures measured in the four years after the merger (item 128)
	<i>Merged Entity R&D</i> <small>t, t+4</small>	Average R&D expenses measured in the four years after the merger (item 46)
Liquidity constraints of the acquirer	<i>Acquirer Debt</i> <small>t-1</small>	Short plus long term debt (items 9 and 34)
	<i>Acquirer Cash</i> <small>t-1</small>	Cash and short term investments (item 1)
	<i>Acquirer CF</i> <small>t-1</small>	Cash flows (sum of earnings before extraordinary items (item 18), and depreciation (item 14)).
	<i>Acquirer KZ</i> <small>t-1</small>	Kaplan and Zingales' (1997) index (see appendix)
	<i>Acquirer KZ</i> <small>Reduced, t-1</small>	Reduced form of Kaplan and Zingales' (1997) index (see appendix)

Table II

Descriptive Statistics (mean values, median in italics)

Variable	All stock	All cash	All other	Mixed
<i>Acquirer Assets</i> <i>Book Value, t-1</i>	2,614.22 <i>418.34</i>	6,378.14 <i>1,288.33</i>	1,529.41 <i>457.53</i>	4,541.03 <i>939.39</i>
<i>Target Assets</i> <i>Book Value, t-1</i>	516.94 <i>70.99</i>	251.08 <i>76.73</i>	352.63 <i>47.94</i>	1,089.80 <i>215.52</i>
<i>Acquirer Assets</i> <i>Market Value, t-1</i>	7,316.46 <i>864.58</i>	16,250.97 <i>1,981.44</i>	1816.14 <i>589.22</i>	8,512.67 <i>1,518.29</i>
<i>Target Assets</i> <i>Market Value, t-1</i>	917.71 <i>140.74</i>	405.68 <i>106.39</i>	344.06 <i>57.89</i>	1,681.96 <i>306.57</i>
<i>Acquirer Equity</i> <i>Book Value, t-1</i>	1,165.17 <i>219.77</i>	2,619.05 <i>594.09</i>	681.91 <i>212.43</i>	1,677.98 <i>341.26</i>
<i>Target Equity</i> <i>Book Value, t-1</i>	195.48 <i>42.53</i>	117.90 <i>40.45</i>	151.69 <i>18.27</i>	345.39 <i>74.89</i>
<i>Acquirer Equity</i> <i>Market Value, t-1</i>	6,839.42 <i>721.04</i>	12,426.44 <i>1,339.23</i>	1,038.23 <i>375.34</i>	5,764.80 <i>945.55</i>
<i>Target Equity</i> <i>Market Value, t-1</i>	645.96 <i>105.91</i>	284.22 <i>64.43</i>	188.23 <i>34.74</i>	978.47 <i>148.44</i>
<i>Acquirer Sales</i> <i>t-1</i>	2,182.65 <i>298.47</i>	5,565.08 <i>1,170.27</i>	1,509.77 <i>522.26</i>	3,882.411 <i>738.71</i>
<i>Target Sales</i> <i>t-1</i>	405.22 <i>64.59</i>	266.11 <i>80.03</i>	408.75 <i>42.50</i>	1,015.25 <i>224.77</i>
<i>Acquirer Employees</i> <i>t-1</i>	12.702 <i>2.34</i>	35.02 <i>9.98</i>	32.17 <i>15.00</i>	21.51 <i>5.43</i>
<i>Target Employees</i> <i>t-1</i>	2.50 <i>0.44</i>	2.44 <i>0.66</i>	5.10 <i>1.10</i>	5.84 <i>1.40</i>
<i>Acquirer KZ</i> <i>t-1</i>	1.08 <i>0.98</i>	0.60 <i>0.57</i>	0.50 <i>0.50</i>	1.14 <i>1.10</i>
<i>Acquirer KZ</i> <i>Reduced, t-1</i>	0.15 <i>0.09</i>	0.03 <i>0.03</i>	0.09 <i>0.16</i>	0.58 <i>0.62</i>
<i>Acquirer Debt</i> <i>t-1</i>	681.21 <i>53.01</i>	1,601.61 <i>291.22</i>	608.55 <i>204.53</i>	1,445.0 <i>325.89</i>
<i>Acquirer CF</i> <i>t-1</i>	299.18 <i>25.50</i>	770.80 <i>111.65</i>	186.49 <i>48.83</i>	432.31 <i>66.90</i>
<i>Acquirer Cash</i> <i>t-1</i>	283.04 <i>45.04</i>	703.84 <i>83.39</i>	116.14 <i>26.63</i>	288.73 <i>42.11</i>
<i>Acquirer Discretionary Accruals</i> <i>t-1</i>	0.02 <i>0.03</i>	0.02 <i>0.02</i>	0.03 <i>0.02</i>	0.01 <i>0.01</i>
<i>Target Discretionary Accruals</i> <i>t-1</i>	-0.01 <i>0.00</i>	0.00 <i>0.00</i>	0.01 <i>0.02</i>	-0.00 <i>0.01</i>
<i>Dispersion of Acquirer EPS Forecasts</i> <i>t-1</i>	9,354.30 <i>1,770.55</i>	15,285.82 <i>2,865.19</i>	8,893.88 <i>2,378.28</i>	13,094.70 <i>2,822.90</i>
<i>Dispersion of Target EPS Forecasts</i> <i>t-1</i>	3,064.90 <i>868.72</i>	2,337.12 <i>908.38</i>	4,803.05 <i>1,028.81</i>	5,854.72 <i>1,561.44</i>
<i>Merged Entity CAPX</i> <i>t, t+4</i>	283.65 <i>41.40</i>	422.05 <i>76.79</i>	163.14 <i>45.96</i>	387.47 <i>76.21</i>
<i>Merged Entity R&D</i> <i>t, t+4</i>	279.14 <i>33.78</i>	512.31 <i>47.38</i>	93.43 <i>17.69</i>	164.61 <i>22.97</i>
N	1,023 39.3%	695 26.7%	165 6.3%	719 27.7%
Of which stock	100%	0	0	41.8%
Of which cash	0	100%	0	23.5%
Of which other	0	0	100%	34.7%

Table III

Method of Payment, Size and Market (Mis)Valuation

Results of OLS regression. The dependent variable is $\log\left(\frac{z}{1-z} + \varepsilon\right)$, with $z \in [0,1]$ = fraction of stock in the payment.

Acquirer Assets Book Value and *Target Assets Book Value* are item 6 of Compustat of the acquirer and target, respectively. *Assets Market Value*, is the book value of assets, plus the market value of common equity (number of common stocks times market price from CRSP), less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74). *Equity Book Value* is the book value of common equity. *Equity Market Value* is the market value of common equity. *Sales* is item 12, *Employees* item 29. *KZ* is the Kaplan and Zingales (1997) index. *KZ_{Reduced}* is the reduced form of the index (without the Tobin's Q). *Debt* is the sum of the book value of short-term debt and long-term debt (items 9 and 34). *CF* is the sum of earnings before extraordinary items (item 18), and depreciation (item 14). *Cash* is the sum of cash and short-term investments (item 1). All the independent variables are measured at the end of the year before the merger. T-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Intercept</i>	-13.84 (-5.01)	-20.28 (-8.09)	-22.08 (-8.05)	-43.32 (-10.38)	-14.55 (-5.07)	-14.42 (-5.03)	-22.08 (-5.40)
<i>log(Acquirer Assets_{Book Value, t-1})</i>	-3.54 (-5.47)				-3.38 (-4.83)	-3.52 (-5.21)	-3.44 (-2.44)
<i>log(Target Assets_{Book Value, t-1})</i>	-3.25 (-4.82)				-3.22 (-4.72)	-3.23 (-4.73)	-3.53 (-3.81)
<i>log(Acquirer Assets_{Market Value, t-1})</i>	0.35 (0.54)		-0.88 (-1.78)	-1.44 (-2.92)	0.22 (0.31)	0.35 (0.51)	3.69 (3.17)
<i>log(Target Assets_{Market Value, t-1})</i>	5.57 (8.26)		4.11 (11.6)	3.69 (7.50)	5.57 (8.19)	5.58 (8.22)	5.81 (6.15)
<i>log(Acquirer Equity_{Book Value, t-1})</i>		-2.63 (-4.60)					
<i>log(Target Equity_{Book Value, t-1})</i>		-2.03 (-4.13)					
<i>log(Acquirer Equity_{Market Value, t-1})</i>		-0.45 (-0.84)					
<i>log(Target Equity_{Market Value, t-1})</i>		4.38 (8.94)					
<i>log(Acquirer Sales_{t-1})</i>			-2.00 (-4.43)				
<i>log(Target Sales_{t-1})</i>			-1.84 (-4.20)				
<i>log(Acquirer Employees_{t-1})</i>				-1.46 (-2.98)			
<i>log(Target Employees_{t-1})</i>				-1.67 (-3.29)			
<i>Acquirer KZ_{t-1}</i>					0.15 (0.44)		
<i>Acquirer KZ_{Reduced, t-1}</i>						0.11 (0.31)	
<i>log(Acquirer Debt_{t-1})</i>							0.19 (0.52)
<i>log(Acquirer CF_{t-1})</i>							-3.48 (-4.61)
<i>log(Acquirer Cash_{t-1})</i>							0.36 (0.95)
Year Dummies	Y	Y	Y	Y	Y	Y	Y
Industry Dummies (2 digits)	Y	Y	Y	Y	Y	Y	Y
N	1,254	1,329	1,250	1,197	1,242	1,242	950
R-squared	0.33	0.32	0.33	0.31	0.33	0.33	0.33

Table IV

Method of Payment and Misvaluation

Results of OLS regression. The dependent variable is $\log\left(\frac{z}{1-z} + \varepsilon\right)$, with $z \in [0,1]$ = fraction of stock in the payment.

Acquirer Assets Book Value and *Target Assets Book Value* are item 6 of Compustat of the acquirer and target respectively. *Asset Market Value* is the book value of assets, plus the market value of common equity (number of common stocks times market price, from CRSP), less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74). *CF* is the sum of earnings before extraordinary items (item 18), and depreciation (item 14). All the above independent variables are measured at the end of the year prior to merger. *Dispersion of EPS Forecasts* is the average of the monthly standard deviation of analyst forecasts of earnings per share, times the number of shares, measured from the beginning of the fiscal year to the day of the announcement of the merger. *Discretionary Accruals* is the difference between realized accruals in the year before the merger and the normal accruals as measured in Chan *et al.* (2006) and Polk and Sapienza (forthcoming). T-statistics are reported in parentheses.

	(1)	(2)
<i>Intercept</i>	-22.79 (-3.52)	-6.67 (-1.23)
<i>log(Acquirer Assets Book Value, t-1)</i>	-0.94 (-0.95)	-0.75 (-0.68)
<i>log(Target Assets Book Value, t-1)</i>	1.81 (4.22)	2.34 (5.91)
<i>log(Dispersion of Acquirer EPS Forecasts t-1)</i>	-0.18 (-1.10)	
<i>log(Dispersion of Target EPS Forecasts t-1)</i>	0.29 (1.77)	
<i>Acquirer Discretionary Accruals_{t-1}</i>		5.09 (1.32)
<i>Target Discretionary Accruals_{t-1}</i>		-5.84 (-1.95)
<i>log(Acquirer CF_{t-1})</i>	-1.39 (-1.56)	-1.52 (-1.50)
Year Dummies	Y	Y
Industry Dummies (2 digits)	Y	Y
N	742	620
R-squared	0.30	0.29

Table V

Method of Payment, Size, Market Misvaluation and Investment Opportunities

Results of OLS regression. The dependent variable is $\log\left(\frac{z}{1-z} + \varepsilon\right)$, with $z \in [0,1]$ = fraction of stock in the payment.

Acquirer Assets Book Value and *Target Asset Book Value* are item 6 of Compustat of the acquirer and target, respectively. *Assets Market Value* is the book value of assets, plus the market value of common equity (number of common stocks times market price), less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74). *CF* is the sum of earnings before extraordinary items (item 18), and depreciation (item 14). All the above independent variables are measured at the end of the year prior to merger. *Merged Entity CAPX_{t, t+4}* and *Merged Entity R&D_{t, t+4}* are, respectively, the average of the capital expenditures (item 128) and research and development expenses (item 46) measured in the four years after the merger. T-statistics are reported in parentheses.

	(1)	(2)
<i>Intercept</i>	-22.81 (-4.87)	-23.84 (-5.07)
<i>log(Acquirer Assets Book Value, t-1)</i>	-2.98 (-2.78)	-2.08 (-1.58)
<i>log(Target Assets Book Value, t-1)</i>	-4.17 (-4.63)	-4.16 (-3.79)
<i>log(Acquirer Assets Market Value, t-1)</i>	1.81 (1.73)	0.76 (0.58)
<i>log(Target Assets Market Value, t-1)</i>	6.21 (6.88)	6.46 (6.10)
<i>log(Merged Entity CAPX_{t, t+4})</i>	1.89 (3.27)	
<i>log(Merged Entity R&D_{t, t+4})</i>		2.27 (3.08)
<i>log(Acquirer CF_{t-1})</i>	-3.08 (-4.18)	-3.34 (-3.40)
Year Dummies	Y	Y
Industry Dummies (2 digits)	Y	Y
N	897	527
R-squared	0.33	0.38

Table VI

**Method of Payment, Size, Market Misvaluation and Investment Opportunities:
Endogeneity issues**

Results of 2SLS regression. The dependent variable is $\log\left(\frac{z}{1-z+\varepsilon} + \varepsilon\right)$, with $z[0,1]$ = fraction of stock in the payment. *Acquirer Assets Book Value* and *Target Assets Book Value* are item 6 of Compustat of the acquirer and target, respectively. *Asset Market Value* is the book value of assets, plus the market value of common equity (number of common stocks times market price, from CRSP), less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74). *CF* is the sum of earnings before extraordinary items (item 18), and depreciation (item 14). All the above independent variables are measured at the end of the year prior to the merger. *Merged Entity CAPX_{t, t+4}* is the average of the capital expenditures (item 128) measured in the four years after the merger. *Median of the Industry Investment_{t, t+4}* is the median of the investment made by all the firms in the same industry of the merged entity measured in the four years after the merger. T-statistics are reported in parentheses.

	(1)	
	First step	
<i>Cons</i>	-0.55	21.34
	(-0.48)	(2.22)
<i>log(Acquirer Asset Book Value, t-1)</i>	0.18	-4.15
	(2.93)	(-2.90)
<i>log(Target Asset Book Value, t-1)</i>	0.12	-4.85
	(2.23)	(-4.57)
<i>log(Acquirer Asset Market Value, t-1)</i>	0.55	-1.48
	(9.24)	(-0.59)
<i>log(Target Asset Market Value, t-1)</i>	-0.06	6.56
	(-1.13)	(6.65)
<i>log(Merged Entity CAPX_{t, t+4})</i>		7.97
		(1.88)
<i>log(Acquirer CF_{t-1})</i>	0.16	-4.05
	(3.78)	(-3.67)
<i>log(Median of the Industry Investment_{t, t+4})</i>	0.43	
	(4.27)	
Year Dummies	Y	Y
Industry Dummies (2 digits)	Y	Y
N	897	
R-squared	0.87	0.25

Table VII

Method of Payment and Equity Issues

Correlations between the acquirer's equity issues and the fraction of cash used in the merger as method of payment. $(Equity\ Issue/Asset)_{t-1}$, $(Equity\ Issue/Asset)_t$, and $(Equity\ Issue/Asset)_{t+1}$ are the ratios of the equity issues (Compustat item 108) over the book value of the assets of the acquirer (item 6) measured, respectively, in the year before, the year of, and the year after the merger.

	Fraction of cash
$(Equity\ Issue/Asset)_{t-1}$	-0.17
$(Equity\ Issue/Asset)_t$	-0.15
$(Equity\ Issue/Asset)_{t+1}$	-0.15

Table VIII

Method of Payment, Equity Issues and Investments After Mergers

Cash (stock) acquirers are firms that use a percentage of cash (stock) as a method of payment higher than 50%. High (low) equity issue firms are firms that issue equity in the year after the merger above (below) the median in the two different groups (cash/stock acquirers). Equity issues is item 108 of Compustat scaled by the book value of the assets (item 6). *Merged Entity (CAPX/Assets)_{t, t+4}* is the average of the ratio of the capital expenditures (Compustat item 128) to the book value of the assets (item 6), measured in the four years after the merger.

	Stock Acquirers		Cash Acquirers	
	<i>Merged Entity (CAPX/Assets)_{t, t+4}</i>	N	<i>Merged Entity (CAPX/Assets)_{t, t+4}</i>	N
<i>Low Equity Issue Firms</i>	0.059	589	0.049	407
<i>High Equity Issue Firms</i>	0.053	555	0.051	358
Difference	0.006		-0.002	
T test	2.10		-0.84	
N		1,144		765

Appendix

Discretionary accruals

I measure the discretionary accruals following Chan et al. (2006), and Polk and Sapienza (forthcoming).

Accruals for firm i at time t are measured as:

$$ACCRUALS_{(i,t)} = \Delta NCCA_{(i,t)} - \Delta CL_{(i,t)} - DEP_{(i,t)},$$

where:

$\Delta NCCA$ is the change in non-cash current assets, i.e., the change in accounts receivable (Compustat item 2), plus the change in inventories (item 3), plus the change in other current assets (item 68);

ΔCL is the change in current liabilities, i.e., the change in accounts payable (item 70), plus the change in other current liabilities (item 72).

DEP is the depreciation (item 178).

$ACCRUALS$ are scaled by asset (item 6).

The discretionary accruals for firm i at time t are measured as the difference between accruals and normal accruals:

$$DACCR_{(i,t)} = ACCR_{(i,t)} - NORMALACCR_{(i,t)},$$

where normal accruals are measured as:

$$NORMALACCR_{(i,t)} = \frac{\sum_{k=1}^3 ACCR_{i,t-k}}{\sum_{k=1}^3 SALES_{i,t-k}} SALES_{i,t}^{19}.$$

In this study, discretionary accruals of the acquirer and target are measured in the year before the merger (t = year before the merger).

Dispersion of analyst forecasts of EPS

Following Gilchrist, Himmelberg and Huberman (2005) I measure the dispersion of analyst earning forecasts as the logarithm of the average of the monthly standard deviation of analyst forecasts of earnings per share, times the number of shares²⁰, measured from the beginning of the fiscal year to the day of the announcement²¹.

Hence the dispersion d is equal to:

$$d = \log\left(\sum_{j=1}^n N_{t-j} SD_{t-j} / n\right),$$

with n = number of months between the beginning of the year and the merger announcement. N represents the number of shares outstanding, and SD_{t-j} is the standard deviation of EPS forecasts for all analysts making forecasts for month j (the value of SD_t is reported on the I/B/E/S summary tape).

¹⁹ Polk and Sapienza (forthcoming) measure the normal accruals in the five years before t. I chose a 3-year time window in order not to lose too many observations. However, using the 5-years period, results do not change.

²⁰ In contrast to Gilchrist, Himmelberg and Huberman (2005) I do not scale the above average by asset, but I take the log of the dispersion, and in the empirical analysis I control for the log of book value of the assets.

²¹ Gilchrist, Himmelberg and Huberman (2005) measure the dispersion in a whole fiscal year. In their case, the number of months taken into consideration does not vary among firms, while in my analysis it varies.

Kaplan and Zingales (1997) index

Following Lamont, Polk, and Saa-Requejo (2001); Baker, Stein, and Wurgler, (2003); and Dong et al. (2007), the original KZ index for year t is defined as:

$$KZ_t(\text{five variables}) = -1.002CF_t - 39.368DIV_t - 1.315C_t + 3.139LEV_t + 0.283Q_t;$$

where CF_t is cash flows (sum of earnings before extraordinary items (item 18), and depreciation (item 14)), scaled by lagged total assets (Compustat item 6); DIV_t is cash dividends (item 21 + item 19), scaled by lagged assets; C_t is cash and short term investments (item 1), scaled by lagged assets; LEV_t is leverage ((item 9 + item 34)/(item 9 + Item 34 + Item 216)), and Q_t is Tobin's Q (market value of assets over book value of assets, both variables are defined in Table 1).

Since Tobin's Q can also be interpreted as a measure of market misvaluation, in order not to use a proxy for financial constraints affected by market mispricing, following Baker, Stein, and Wurgler (2003) and Dong et al. (2007), I construct a four-variable version of the KZ index, excluding Tobin's Q:

$$KZ_t = -1.002CF_t - 39.368DIV_t - 1.315C_t + 3.139LEV_t;$$

Table A

Method of Payment, Size and Market (Mis)Valuation

Results of multinomial logit regression. *Acquirer Assets Book Value* and *Target Assets Book Value* are item 6 of Compustat of the acquirer and target, respectively. *Assets Market Value* is the book value of assets, plus the market value of common equity (number of common stocks times market price from CRSP), less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74). *Sales* is item 12. *KZ* is the Kaplan and Zingales (1997) index. *Debt* is the sum of the book value of short-term debt and long-term debt (items 9 and 34). *CF* is the sum of earnings before extraordinary items (item 18), and depreciation (item 14). *Cash* is the sum of cash and short-term investments (item 1). All the independent variables are measured at the end of the year before the merger. T-statistics are reported in parentheses.

	(1)		(2)		(3)		(4)	
	Stock (1) vs cash (0)	Mixed (1) vs cash (0)	Stock (1) vs cash (0)	Mixed (1) vs cash (0)	Stock (1) vs cash (0)	Mixed (1) vs cash (0)	Stock (1) vs cash (0)	Mixed (1) vs cash (0)
<i>Cons</i>	0.32 (0.35)	0.63 (0.48)	-1.20 (-1.26)	0.02 (0.02)	0.12 (0.13)	0.32 (0.24)	-2.68 (-2.19)	0.49 (0.27)
<i>log(Acquirer Asset Book Value, t-1)</i>	-0.88 (-5.58)	-0.46 (-1.89)			-0.85 (-5.22)	-0.31 (-1.28)	-0.71 (-2.52)	-0.07 (-0.15)
<i>log(Target Asset Book Value, t-1)</i>	-0.80 (-4.79)	-0.35 (-1.53)			-0.81 (-4.77)	-0.38 (-1.61)	-0.72 (-3.54)	-0.22 (-0.70)
<i>log(Acquirer Asset Market Value, t-1)</i>	0.19 (1.27)	-0.16 (-0.68)	-0.09 (-0.75)	-0.19 (-1.14)	0.17 (1.07)	-0.29 (-1.2)	0.87 (3.66)	-0.12 (-0.27)
<i>log(Target Asset Market Value, t-1)</i>	1.26 (7.22)	0.87 (3.70)	0.95 (7.79)	0.69 (4.37)	1.28 (7.20)	0.88 (3.70)	1.17 (5.42)	0.80 (2.48)
<i>log(Acquirer Sales t-1)</i>			-0.54 (-4.32)	-0.42 (-2.59)				
<i>log(Target Sales t-1)</i>			-0.51 (-4.40)	-0.17 (-1.18)				
<i>Acquirer KZ t-1</i>					0.10 (1.33)	0.31 (3.34)		
<i>log(Acquirer Debt t-1)</i>							0.04 (0.56)	-0.05 (-0.43)
<i>log(Acquirer CF t-1)</i>							-0.81 (-4.48)	-0.35 (-1.22)
<i>log(Acquirer Cash t-1)</i>							0.04 (0.54)	-0.10 (-0.82)
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Industry Dummies (2 digits)	Y	Y	Y	Y	Y	Y	Y	Y
N	1254	1254	1250	1250	1242	1242	950	950
Pseudo R-squared	0.27	0.27	0.27	0.27	0.27	0.27	0.29	0.29

Table B

Method of Payment, Size, Market Misvaluation and Investment Opportunities

Results of multinomial logit regression. *Acquirer Assets Book Value* and *Target Asset Book Value* are item 6 of Compustat of the acquirer and target, respectively. *Assets Market Value* is the book value of assets, plus the market value of common equity (number of common stocks times market price), less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74). *CF* is the sum of earnings before extraordinary items (item 18), and depreciation (item 14). All the above independent variables are measured at the end of the year prior to merger. *Merged Entity CAPX_{t, t+4}* and *Merged Entity R&D_{t, t+4}* are, respectively, the average of the capital expenditures (item 128) and research and development expenses (item 46) measured in the four years after the merger. T-statistics are reported in parentheses.

	(1)		(2)	
	Stock (1) vs cash (0)	Mixed (1) vs cash (0)	Stock (1) vs cash (0)	Mixed (1) vs cash (0)
<i>Cons</i>	-19.12 (-14.24)	-24.96 (-12.31)	-1.65 (-0.26)	-3.94 (-0.60)
<i>log(Acquirer Asset Book Value, t-1)</i>	-0.68 (-2.86)	-0.53 (-1.42)	-0.34 (-1.20)	-0.54 (-1.14)
<i>log(Target Asset Book Value, t-1)</i>	-0.94 (-4.45)	0.20 (0.67)	-0.99 (-3.84)	0.30 (0.86)
<i>log(Acquirer Asset Market Value, t-1)</i>	0.67 (2.67)	0.37 (0.98)	0.55 (1.81)	0.92 (1.91)
<i>log(Target Asset Market Value, t-1)</i>	1.36 (6.13)	0.34 (1.12)	1.47 (5.47)	0.19 (0.51)
<i>log(Merged Entity CAPX)_{t, t+4}</i>	0.54 (3.94)	0.40 (1.96)		
<i>log(Merged Entity R&D)_{t, t+4}</i>			0.36 (2.20)	0.02 (0.09)
<i>log(Acquirer CF_{t-1})</i>	-1.05 (-4.55)	-0.86 (-3.03)	-1.12 (-4.33)	-0.99 (-3.13)
Year Dummies	Y	Y	Y	Y
Industry Dummies (2 digits)	Y	Y	Y	Y
N	897	897	527	527
Pseudo R-squared	0.30	0.30	0.33	0.33