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To Roberta and Adriano,
my North Stars

Essay in Corporate Finance and Real Investments

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Any remaining errors are my own.

INTRODUCTION

This study analyzes the cause underlying the method of payment (cash or stock) in corporate mergers. Specifically it tests Myers' (1977) theory of debt overhang in the context of mergers, using the level of post merger investments made by the merged entity on the base of Lamont's (2000) findings.

In Myers (1977) a firm's borrowing is inversely related to its investment opportunities. When a firm is burdened with risky debt, some of the gain of its future investments accrues to existing creditors. Therefore, managers who want to maximize shareholder value will be reluctant to undertake those additional investments. Hence, firms that have access to many investment opportunities (i.e. firms that have real growth options) would tend to make less use of debt.

Myers' (1977) theory can be applied to the merger context. The merger is a particular kind of large size investment and it has an uncertain outcome (successful/profitable or unsuccessful/unprofitable merged entity). The way of financing it might influence the future discretion of managers to take advantage of other investment opportunities. Hence, firms that have high investment opportunities prefer to make stock mergers and they invest more after the merger than firms that make cash mergers.

In the merger context the investment opportunities theory has been already tested by Martin (1996), who uses Tobin's Q as a measure of investment opportunities. A high market value compared to the book value of the assets is an indicator that the firm is well run or has good business opportunities. Martin's (1996) results confirm that firms with high Tobin's Q are more willing to make stock mergers.

By contrast, an alternative theory about the choice of the method of payment in merger is the market misvaluation, according to which bidders that are overvalued by the market prefer to use stock instead of cash (see Shleifer and

Vishny, 2003). Tobin's Q is also used to test this theory, being commonly adopted as a good proxy for market misvaluation.

Hence, despite several studies addressing the question of the method of payment in mergers (see Martin, 1996, Shleifer and Vishny, 2003, Dong et al., 2006), the issue still remains an open question. Specifically, the measure used to test the two theories of market misvaluation and investment opportunities is the same, i.e. Tobin's Q, and it is difficult to disentangle which effect Tobin's Q represents (see Dong et al., 2006).

I propose a different measure of the investment opportunities of a firm: the level of the post merger investments of the merged entity (measured by the capital expenditures). According to Lamont (2000) there is a very high correlation between the level of projected investments and the investments actually made. Hence, managers project in advance the level of investments to be made on the basis of the firm's investment opportunities and then follow their plan strictly. According to Lamont's (2000) findings it can be argued that the level of post merger investments are proxies of the projected ones and, therefore, of the investment opportunities of the merged entity.

Using the post merger investments I can distinguish the impact of investment opportunities (proxied by capital expenditures) from the impact of market misvaluation (proxied by Tobin's Q effect not captured by the capital expenditures) on the method of payment. The two theories are not mutually exclusive.

Hence, the study tests Myers' (1977) theory in the merger context using a new proxy for investment opportunities. The work is innovative because it can differentiate the impact of investment opportunities and market misvaluation in the choice of the method of payment in mergers. Moreover it analyzes carefully and broadly the level of post merger investments, which so far has been marginally studied.

The sample consists of 1,462 completed US mergers (both acquirers and targets are publicly traded U.S.-based firms) announced between 1984 and 2000.

Data on mergers are from the Securities Data Company (SDC) Platinum, accounting data are from COMPUSTAT and stock prices from CRSP. The time-window analyzed for capital expenditures and for accounting data in general is four years before and four years after the mergers (9 years in total).

In my empirical analysis, as a first step I observe the pattern of the ratio of capital expenditures over assets (C/A henceforth) of the acquirer in the four years before the merger and the C/A of the merged entity in the four years after the merger. Both stock and cash acquirers show a stable, though slightly declining, level of C/A. Immediately after the merger, the level of C/A drops systematically. However, over the four years after the merger, the ratio is again stable and slightly declining. The findings suggest that in the four years before and after the merger, managers seem to decide a certain level of capital expenditures, with little change from one year to another.

Based on the stable pattern of C/A and on the previously discussed findings of Lamont (2000) I argue that the level of capital expenditures can be a proxy for the investment opportunities of a firm. Managers set the level of investments in advance presumably according to the level of investment opportunities that the firm is supposed to have, and then follow their plan without sudden changes in the level of the investments.

As a first step to test Myers' theory I calculate the four years before the merger average C/A of the acquirer ($\overline{CA}_{acquirer\_before}$ henceforth) and the four years after the merger average C/A of the merged entity ($\overline{CA}_{merged\_after}$ henceforth). I run a difference of mean test of $\overline{CA}_{acquirer\_before}$ between cash acquirers and stock acquirers, and a difference of mean test of $\overline{CA}_{merged\_after}$ between merged entities that have used cash and merged entities that have used stock as a method of payment. The $\overline{CA}_{acquirer\_before}$ of cash acquirers is significantly lower if compared to the $\overline{CA}_{acquirer\_before}$ of stock acquirers. Furthermore the $\overline{CA}_{merged\_after}$ of the "new firm" is again significantly lower for merged entities that have used cash as a method of payment than merged entities that have used stock.

Hence, the univariate analysis is in line with Myers' (1977) theory and suggests that an acquirer with high internal investment opportunities would be less willing to use cash as a method of payment in a merger and to borrow funds, thus increasing the leverage of the firm.

As a further test of Myers' (1977) theory in the merger context, I run a logistic regression with which I analyze how the investment opportunities of a firm (the C/A ratio) affect the method of payment. As the dependent variable, I use the method of payment (cash or stock) and as the independent variable the investment opportunities of the merged entity (proxied by the $\overline{CA}_{merged\_after}$). I control for several variables: market misvaluation (proxied by Tobin's Q of the acquirer), cash flow and liquidity constraints of the acquirer, relative size of the target compared to the acquirer, relatedness of bidder and target sectors, and industries.

The results of the analysis show that $\overline{CA}_{merged\_after}$ is strongly significant. Hence, investment opportunities do drive the choice of the method of payment in mergers, thus confirming Myers (1977) in the merger context. Firms with higher investment opportunities use stock as a method of payment, while firms with low investment opportunities use cash.

However, Tobin's Q, the proxy for market misvaluation, is strongly significant too. Firms with high Tobin's Q prefer to make stock mergers. Therefore, the misvaluation effect has an impact on the method of payment too. The results might also suggest a possible link between the growth opportunities and the market misvaluation hypotheses. It might be that both managers and the market are too optimistic about the growth potential of the firm. The "believed" investment opportunities lead both to overconfidence of the managers and to market misvaluation.

To check the robustness of these results I have used different specifications of the logistic regression. I have changed the time-window of the control variables, I have added dummies for the year of merger to control for the

time fixed effect, I have controlled if other mergers made by the same acquirer five years before and after the merger had affected the results, and if the total number of mergers done by the acquirer in the eleven years time-window analyzed had altered the findings. Finally, I restricted my sample to only those firms that have made a single merger in the eleven years. Results do not change in each of these specifications, showing the robustness of the findings.

The study is structured as follows. Section I reviews the relevant literature. Section II explains the data and methodology. Section III presents the univariate analysis while Section IV the multivariate analysis. Section V discusses them. Section VI draws the conclusions.

I. LITERARY REVIEW AND HYPOTHESIS

In this section, I present a review of the literature from which I draw my hypothesis.

To demonstrate my hypothesis and the possible counterarguments I have decided to divide the section in seven subsections.

I.A Myers' Theory of Debt Overhang

In his "Determinant of Corporate Borrowing" (1977), Myers illustrates the idea of debt overhang, which, since then, has become one of the pillar of corporate finance.

The basic idea is that if a firm is burdened with risky debt, some of the gains deriving from future investments will accrue to existing creditors to a level that managers who maximize the shareholder's value will be less inclined to invest. Hence, the firm will loose possible investment opportunities.

In Myers' words "[] a firm with risky debt outstanding, and which acts in its stakeholders' interest, will follow a different decision rule than the one which can issue risk-free debt or which issues no debt at all. The firm financed with risky debt, will, in some states of nature, pass up valuable investment opportunities-opportunities which could make a positive net contribution to the market value of the firm. Issuing risky debt reduces the present market value of the firm by inducing a future strategy that is suboptimal in the sense just described" (p.149).

The implication of this theory is that managers of firms with lots of discretionary investments (that is, real growth options) will make less use of

debt. “The paper predicts that corporate borrowing is inversely related to the proportion of market value accounted for by real options [growth opportunities]” (p.147).

The more the assets in place are risky, the more the problem of the debt overhang is pronounced, i.e. the less inclined the manager will be to undertake future investments.

Myers’ debt overhang theory can be applied to the context of mergers, since the merger is a particular kind of large size investment and it has an uncertain outcome (successful/profitable or unsuccessful/unprofitable merged entity). The use of cash or stock, i.e. the way of financing, might influence the future discretion of managers to take advantage of other investment opportunities.

Hence:

firms with high investment opportunities should use stock as a method of payment in mergers instead of cash.

However, how should the investment opportunities be measured? Based on Lamont’s (2000) result, I propose a new measure of the investment opportunities: the level of post merger investments.

I.B Lamont and Projected and Actual Investments

Lamont (2000) finds that there is a strong link between planned and actual investments. Specifically planned investments do a great job in forecasting actual investments.

His study is based on a survey of capital expenditure plan run by the U.S. Commerce Department between 1947 and 1993. The Commerce department asked companies their planned investments (planned capital expenditures on

plant and equipment) for the subsequent year. The Commerce Department aggregated the firms' answers and released the planned firms' investment plans at the aggregate and at the industry level. Specifically the firms were asked to report "all capital expenditures, you expect to make in each of the forthcoming time period shown, whether or not commitments or orders have already been placed" (Green and Hertzberg, 1980, p.41). Unluckily, the survey was suspended in September 1994.

Lamont (2000) finds that "more than three quarters of the variation in aggregate investment in a given year can be forecasted at the beginning of the year using plans, and plans drive out other forecasting variables. Thus, variation in expected investments is a large part of the variation in actual investment. This fact is consistent with lags in the investment process that cause a large part of this year's investment to be chosen last years" (p.2743).

Specifically, Lamont investigates the real investment growth of U.S. firms' aggregate investments. The real investment growth is calculated as the nominal investment growth minus inflation for capital goods. The nominal investment growth is $i_t = (I_t / I_{t-1}) - 1$, where I_t is the annual expenditure on plant and equipment. Planned investment growth is $\hat{i}_t = (\hat{I}_t / I_{t-1}) - 1$, where $\hat{I}_t$ is the planned investment declared by the company. The real actual investment growth is $g_t = (I_t / I_{t-1}) - (D_t - D_{t-1})$ and the real planned growth is $\hat{g}_t = (\hat{I}_t / I_{t-1}) - (D_t - D_{t-1})$, where D_t is the nonresidential fixed investment deflator from the national income accounts.

$g_t - \hat{g}_t$ is the difference between actual growth and planned growth, and, as can be seen, the inflation adjustment does not affect $g_t - \hat{g}_t$.

Lamont finds that the planned real investment growth ($\hat{g}_t$) has a strong correlation with the actual real investment growth (g_t), equal to 0.87. The revision between subsequent years ($g_t - \hat{g}_t$) is on average 0.014.

Lamont also runs an OLS regression with the actual real investment growth (g_t) as dependent variable, and, among the independent variables, the author introduces in the regression the lagged real investment growth (g_{t-1}) and the real planned growth ($\hat{g}_t$). Both the variables are significant with a positive sign. Hence, firms seem to follow their plan in choosing the actual level of investments and there is a consistency in the choice of the level of investments in subsequent years.

Specifically, ($\hat{g}_t$) has a coefficient of 0.94, almost one, with a robust standard error of 0.09.

Controlling for the industry effect result does not change: both the lagged real investment growth (g_{t-1}) and the real planned growth ($\hat{g}_t$) are significant and positive and ($\hat{g}_t$) has again a coefficient near one (0.92).

Another interesting result related to my study is the relationship between return and investment. Mispricing or market misvaluation can lead to the issuance of overvalued stock by managers and to the use of proceeds in new investments, whether profitable or not. In the merger context, the issuing of new equity is equal to make a stock merger (instead of a cash one). Hence, it might be argued that managers would both make stock mergers and invest more after the merger because the stock is overvalued.

However, according to Lamont's (2000) study "A specific mispricing story is that irrational investors sometimes incorrectly value physical capital, and that managers respond to overvalued stock prices by issuing equity and investing the proceeds in physical capital. The evidence does not support this explanation for the negative covariation of investment plans and future stock returns. Controlling for equity issuance does not affect the predictive power of investment plans" (p.2743).

Hence, on the basis of the above mentioned findings, I can argue that planned investments can be a good proxy for the actual ones. In the merger context the post merger investments should be correlated with the investments

that manager plan to make after the merger thus mirroring the investment opportunities of the new merged entity.

I.C Hypothesis

As stated before, we can apply Myers' theory of debt overhang to the specific context of mergers. The merger is the initial investment that the firm should be careful how to finance, in order not to affect the decision of managers to undertake future investment opportunities. In the merger context the equity (debt) way of financing the initial investment becomes the use of stock (cash) as a method of payment. This large size investment has undoubtedly an uncertain and risky outcome (successful/profitable or unsuccessful/unprofitable merged entity). Hence, the choice between the use of cash or stock as a method of payment might influence the future discretion of managers to take advantage of other investment opportunities.

The measure of the future investment opportunities of the merged entity are the actual investments made by the merged entity itself. Actual investments have a strong correlation with planned ones (Lamont, 2000) and planned investments themselves are the mirror of believed investment opportunities by managers of the merged entities. Therefore, the actual investments should be good proxies for investment opportunities.

I can derive my hypothesis from Myers' debt overhang theory applied to merger and Lamont (2000) study on investments.

HP: Firms with high (low) investment opportunities, i.e., high (low) level of post merger investments, use stock (cash) as a method of payment in mergers.

I.D Previous Studies on Investment Opportunities and Method of Payment in Mergers

In 1996 Martin studies the relationship between several characteristics of acquirers and targets and the method of payment used in mergers. Among the possible explanations of the method of payment chosen, Martin (1996) analyzes the investment opportunities. As a proxy for the investment opportunities the author uses Tobin's Q[1], commonly adopted by the previous literature.

According to Martin (1996), the link between investment opportunities (however measured) and the use of a particular method of payment in mergers has its foundation not only in Myers (1977), as I have already explained, but also in the agency cost of debt combined with the asymmetric information model of Myers and Majluf (1884), (as in Jung et al., 1995).

"Combining the agency cost of debt with the asymmetric information model of Myers and Majluf (1984), Jung, Kim and Stulz (1995), argue that managers with grow objectives prefer to raise capital with equity because it gives them more discretion over the funds raised than debt financing. In contrast to equity, debt requires management to pay out cash flow so that they cannot use cash flow to invest in poor projects. Consequently, debt financing maximizes firm value for firms with poor investment opportunities. In contrast the discretion associated with equity financing is valuable for firms with good investment opportunities since it makes it more likely that these firms can fully take advantage of their investment opportunities" (p.1229).

Hence, both Myers' (1977) theory and Jung's, Kim's and Stulz's (1995) one, if applied to the merger context, predict that firms with high (low) investment opportunities use stock (cash) as a method of payment in merger.

As said, Martin (1996) tests the theory using the acquirer Tobin's Q as proxy for the investment opportunities.

[1] Tobin's Q is usually measured as the market value of the assets over the book value of the assets of a firm. For the specific method of measurement of this variable see the Data section.

The author analyzes U.S. mergers made by public acquirers listed on either the New York (NYSE) or the American Stock Exchange (AMEX) between 1978 and 1988. The final sample is made up of 846 mergers, 250 of which are stock mergers, 483 cash mergers and 113 mixed mergers (cash and stock).

Martin (1996) runs binomial logistic regression and multinomial logistic regression using as dependent variables the method of payment (stock, cash, mixed) and as independent variables, among the others, the Tobin's Q of the acquirer. In all the regressions (with the exception of the one with dummy dependent variable 1 if the method of payment is mixed, 0 if it is cash) the Tobin's Q is significant and the sign of the coefficient is as expected. Specifically, in the case of dummy dependent variable 1 if the method of payment is stock, 0 if it is cash, the Tobin's Q is significant with a positive coefficient.

Firms with high investment opportunities (Tobin's Q) make stock mergers rather than cash ones. "The results of this article strongly support the idea that higher acquiring-firm investment opportunities lead to an increased use of stock financing in corporate acquisitions. Equity financing conveys lower potential constraints on managers, thus giving them increased flexibility in their current investing and future financing plans" (p.1243).

At a first glance it seems that the investment opportunity hypothesis has been already proven. However, there is a key point that must be raised: the measure of investment opportunity used is Tobin's Q, a variable that has been applied in other studies to prove a different theory about the method of payment in mergers, i.e. the market misvaluation.

I.E Market Misvaluation and Method of Payment in Mergers

Managers of acquirers that are positively misvaluated by the market will prefer to make stock mergers instead of cash ones. If a manger knows that his

firm is overvalued (or is more overvalued than the target firm) he would be more inclined to use its stock as a method of payment. “[] transactions are driven by stock market valuations of the merging firms. The fundamental assumption of the model is that financial markets are inefficient, so some firms are valuated incorrectly. In contrast managers are completely rational, understand stock market inefficiencies, and take advantage of them, in part through merger decisions. Mergers in this model are a form of arbitrage by rational mergers operating in inefficient markets. This theory is in a way opposite of Roll (1986) hubris hypothesis of corporate takeover in which financial markets are rational, but corporate managers are not” (Shleifer and Vishny, 2003, p.296).

In this theory, there is asymmetric information between managers and market about the real value of the firms’ stock. Managers “time the market” taking advantage of the overvaluation of their firms both using stock as a method of mergers and choosing almost the time in which the stock are more overvalued to make the mergers.

Shleifer and Vishny (2003) illustrate some implications of their model for the acquirer’s, target’s and merged entity’s returns and for the mergers waves of the 1980s and 1990s.

A first empirical finding that supports the theory is the one shown by Andrade et al. (2001). In 66% of the mergers between 1973 and 1998 the acquirer’s Tobin’s Q is higher than the target’s Tobin’s Q: the acquirer is more overvalued than the target. Furthermore, Rau and Vermaelen (1998) find that value acquirers outperform “glamour” acquirers in the three years after the merger, and that “glamorous” acquirers use stock as a method of payment more often than value acquirers do.

Shleifer and Vishny (2003) find evidence of their theory also in the merger waves, specifically in the results of Andrade et al. (2001) who show that in high valuation markets there are more stock acquisitions. 45.6% of the 1980s takeovers (who are supposed to be value mergers) are *any* stock (stock and

mixed) mergers, while in the 1990s wave of takeovers (considered as value destruction mergers) the percentage reaches 70.9%.

The above ones are just a few examples shown by the authors as empirical support of their theory.

However, if their theory is true, why should a target accept to make a stock merger when it is less overvalued than the acquirer? The authors suggest that among the many reasons there is the fact that the acquirer pays the target managers in different ways: acceleration in the exercise of stock options, severance pay, or offering them top positions in the merged entity.

"Both the target and the acquirer managers benefit: the former by cashing out or keeping a good job, the latter by increasing the long-run value of their equity. When target managers sell out, both they and the bidder managers in effect get rid of overvalued equity: one through a personal sale, the other through issuance. The absence of such gains from trade (at the expense of the new bidder shareholders) is precisely why we see more hostility in tender offer than in stock merger" (Shleifer and Vishny, 2003, p.303).

The most common way to measure the market misvaluation is Tobin's Q or similar ratios as for example the market value of the common equity over the book value of common equity.

"The association of book to price [book to price value of the equity, a ratio similar to the Tobin's Q one which generally take into account the market and book value of the assets rather than the equity one] although with subsequent abnormal return suggests that some of its variation derives from misvaluation or risk. However book to price has also been used as a proxy for growth opportunities and the degree of information asymmetry". (Dong et al., 2006, p.733).

Hence both the market misvaluation and the investment opportunities theories about the method of payment in mergers use respectively Tobin's Q as proxies of the acquirer's market misvaluation and investment opportunities.

What is then really measuring Tobin's Q, the investment opportunities or the market misvaluation? In the first case investors are rational and understand the real growth opportunities of the firm. In the case of market misvaluation, instead, the market is irrational and fooled by rational managers. Managers time the market and, on the base of their esteem of the overvaluation, decide to make stock merger at the moment they think the firm is more overvalued (thus deciding the method of payment and the timing).

Is there a way to understand the true meaning of Tobin's Q? The debate is still open about this measure and the meaning of its effect on mergers.

I.F Tobin's Q

Dong et al. (2006) try to understand the real meaning of Tobin's Q in takeover and study its relationship with takeover characteristics (method of payment, bid premium, combativeness of the mood of the offer, and mode of the offer).

Specifically, they study the P/B (price to book value of equity) and P/V (price to residual income value). P/B behaves very similar to Tobin's Q or, as the same authors states, "P/B (or closely allied variables such as proxies for Tobin's Q)". (Dong et al., 2006, p. 727).

Dong et al. (2006) analyze takeovers bids between 1978 and 2000. They study successful bids done by public acquirers and targets traded on the NYSE, AMEX or NASDAQ, with a minimum value per transaction of ten million dollars. The total number of attempted takeovers taken into consideration is 3,732 with a mean value per transaction expressed in 2001 dollars of 1,481.1 million dollars. Of the 3,732 attempted takeovers 2,922 result in successful and 810 in unsuccessful bids.

The authors report the breakdown of transactions by years, and in each year they show the percentage of cash, stock and mixed bids. Results are consistent with the ones showed in the Data section.

They find that acquirers with high P/B and P/V prefer to make stock takeovers rather than cash ones and merger rather than tender offer. High P/B acquirers pay higher premia and are characterized by lower bidder-announcement-date abnormal stock return.

The authors run a univariate analysis, specifically a t-test of P/B for stock, cash and mixed acquirers. Stock acquirers have significantly higher P/B ratios than cash and mixed ones. Findings are similar to the ones shown in the Univariate Analysis section.

They also run a logistic regression with dummy variable 1 if method of payment in the takeover is cash, 0 otherwise. The acquirer's P/B ratio is significant at the 0.01 level with negative sign. Again results are in line with the ones shown in the Multivariate Analysis Section.

"[]there are a variety of regularities about valuations and takeover behavior that offer substantial support for both the misvaluation and the Q [investment opportunities] hypothesis. Neither theory explains all aspects of the data, and for some takeover characteristics the hypothesis do not offer unambiguous predictions. The distinctive P/V findings of the misvaluation hypothesis receive substantial support. However, in some cases there are findings that are significant with P/B but not P/V, an outcome that tends to be more strongly supportive of the Q [investment opportunities] hypothesis." (Dong et al., 2006, p.754-755).

On the other side, there is a finding that supports more the interpretation of the Tobin's Q and its proxies as a measure of the market misvaluation: acquirers with high P/B have lower announcement-period return. The finding is in contrast with the ones of Servaes (1991).

Servaes (1991) analyzes 704 complete takeovers in the period between 1972 and 1987. He finds that the abnormal return of targets and bidders are larger when targets have low Tobin's Q and bidder have high Tobin's Q.

It appears that the interpretation of P/B (and consequently of Tobin's Q) could differ across periods: findings seem to attribute to the variable the meaning of the investment opportunities in the 1980s merger wave and of the market misvaluation in the 1990s one.

Dong et al. (2006) point out an interesting issue: it could be stated that it is not misvaluation that affect takeovers but a biased assessment by managers that there is an overvaluation. If managers believe that the firm is overvalued in the sense that the price to book ratio or the Tobin's Q is too high for them, they decide accordingly whether there is or not a misvaluation.

Hence, there is still no agreement for a possible interpretation of the variable. This supports the choice of the proxy used in this study to measure the investment opportunities.

In the multivariate analysis I will perform, the level of post merger investments should be able to capture the true investment opportunities of the merged entity, leaving to Tobin's Q the sole meaning of market misvaluation.

In other words the level of investment opportunities should be able to capture the part of the Tobin's Q that is related to the market rational expectation of the future growth of the firm.

The use of the new variable will pursue two tasks:

1) To test the investment opportunities hypothesis;
2) To understand the effect of the market misvaluation.

Hence, the present study is not only a test of a theory with "another" proxy rather than the usual one (Tobin's Q). The attempt is to find the true measure of the investment opportunities of the firm, to test *jointly* the two hypotheses and to

understand the effect both of the investment opportunities and of the market misvaluation.

Finally, the study makes an attempt to reconcile the two theories.

In the following section, Data, I provide support of my proxy for the investment opportunities and describe my sample. The first step to demonstrate the hypothesis will be done in the Univariate Analysis. As Martin (1996) and Dong et al (2006) have done, I will perform a t-test of the investment opportunities proxy between the cash and stock mergers. In the case of Martin (1996) and Dong et al. (2006) the investment opportunities proxy was the Tobin's Q.

The second step to test my hypothesis is to run a logistic regression (as again in Martin, 1996, and Dong et al., 2006), with dummy dependent variable 1 if the method of payment is cash, 0 otherwise and as independent variables my proxy for the investment opportunities and the Tobin's Q, i.e. the market misvaluation.

Finally, it is worthwhile to mention other theories that explain the method of payment in mergers: the last part of the literature review section is dedicated to their description.

I.G. Other Theories of Method of Payment in Mergers

The investment opportunities and the market misvaluation are not the only theories that try to explain the method of payment in mergers. In this subsection I will describe the other main ones and specifically:

1) the risk sharing theory;
2) the cash availability theory;
3) the control theory;
4) the outside monitoring theory.

The risk sharing theory has its foundation on the asymmetric information between target and bidder (see Hansen, 1987). Suppose that the target knows its value better than the acquirer does. The acquirer faces the problem of asymmetric information about the target value and it will be more willing to use stock as a method of payment, in order to share with the target any post acquisition revaluation effect.

The problem will be more pronounced if the target is big, or if it is big compared to the acquirer. In these cases the risk that the acquirer faces is certainly higher.

The cash availability theory has its foundation on the pecking order theory of Myers (1984). In order to finance its investments a firm follows a hierarchy: internal finance, then borrowing, then external equity financing. Moreover firms with huge amount of free cash flow would choose cash as a method of payment (Jensen, 1986). Hence, firms with high cash availability will make cash merger rather then stock ones.

In the control theory, if managers have large shares in the acquiring firm they will be less willing to make stock mergers, since it would dilute their control in the merged entity (see Stulz, 1988, Jung et al., 1995). However, this effect should be less strong at the very low and very high level of ownership (see Martin, 1996). Hence, in the presence of managers that own a discrete amount of acquirers' shares (although not almost all of them) there is a higher probability of cash merger rather than stock merger.

Regarding the outside monitoring theory, "Jensen (1991) argues that active investors provide benefits because of their incentive to undertake costly monitoring. Blockholders and institutional shareholders are examples of potentially active investors. Black (1992) argues that institutional shareholder can take actions that more properly align managers' interest with those of

shareholder.[] In addition, some institutional shareholders communicate directly with senior management and thus may influence the terms of acquisition bids" Martin, 1996, p.1232.

Hence, firm with active investors such as blockholders and institutional shareholder, should be less willing to make stock merger, given the fact that a number of studies have proved that stock mergers reduce acquirers' shareholder value.

I now turn to the empirical tests of my hypothesis.

II. DATA

Data on mergers are obtained from the Securities Data Company (SDC) Platinum U.S. mergers and acquisitions database between 1984 and 2000. I include in my sample only successful mergers according to the following criteria:

- both acquirers and targets are U.S. public firms;
- the offer was announced between January 1, 1984 and December 31, 2000;
- all mergers are completed;
- acquirers and targets do not belong to financial, insurance and real estate industries;
- mergers in which capital expenditures of the acquirer (merged entity) are not available for at least one of the four years before (after) the merger are dropped from the sample.

The final sample includes 1,462 mergers: 574 are mergers in which the acquirer has used cash as a method of payment (cash mergers henceforth), 598 are mergers in which the acquirer has used stock as a method of payment (stock mergers henceforth), and 290 are mergers in which the acquirer has used both cash and stock as a method of mixed payment (mixed acquirer henceforth). Unfortunately SDC does not always provide the percentage of cash and stock used in the payment for mixed mergers.

Table I shows information about the number of mergers in my sample, mean value per transaction and percentage of cash, stock and mixed merger by calendar year.

Table I

Descriptive Statistics of the Sample

Number of mergers, mean value per transaction and percentage of cash, stock and mixed mergers, by calendar year. The sample includes all successful and completed mergers of U.S. public acquirers and target announced between 1984 and 2000. Acquirers and targets do not belong to the financial, insurance and real estate industries. Mergers in which capital expenditures of the acquirer (merged entity) are not available for at least one of the four years before (after) the merger are dropped from the sample.

Year	N	Mean Value Per Transaction	Cash (%)	Stock (%)	Mixed (%)
1984	27	728.2	7.4	22.2	70.4
1985	44	398.9	54.5	27.3	18.2
1986	63	545.7	69.8	25.4	4.8
1987	58	218.7	70.7	13.8	15.5
1988	53	278.7	73.6	15.1	11.3
1989	50	574.5	54.0	38.0	8.0
1990	34	308.7	52.9	41.2	5.9
1991	37	508.2	37.8	46.0	16.2
1992	29	322.2	34.5	44.9	20.7
1993	30	226.9	40.0	23.3	36.7
1994	64	776.9	32.9	48.4	18.7
1995	99	636.7	36.4	49.5	14.1
1996	120	800.1	28.3	55.0	16.7
1997	165	899.0	29.5	48.5	22.0
1998	189	1,259.8	35.3	45.5	19.2
1999	214	1,681.9	38.7	39.8	21.5
2000	186	2,810.1	32.2	41.4	26.3

The number of mergers is higher in the middle of the 1980s and in the second half of the 1990s. The mean value per transaction (shown in current US dollar), underlines that the size of transactions strongly increases in the second half of the 1990s. The acquisition wave of the second half of the nineties is also characterized by a higher use of stock as a method of payment (see Andrade et al., 2001). Data on number of mergers per year, mean value per transaction and method of payment are consistent with Dong et al. (2006) and Andrade et al. (2001).

Table II compares the descriptive statistics of my sample with Andrade et al. (2001) in terms of total number of mergers, percentage of payment by cash, stock, mixed, bidders per deal, median of relative size of target over acquirer, relatedness of acquirer and target industry, and the median of the takeover premium.

The relative size is measured as the ratio of the market value of the target over the acquirer both calculated twenty days before the merger announcement. Acquirer and target are related in terms of industry if the first two digits of the acquirer SIC code are the same of the first two digits of the target. Unfortunately, the takeover premium is not always available in SDC. Hence, as a proxy for the premium I use the percentage increase in value of the target shares between the twenty days before the merger announcement and the day after the merger announcement. Stock prices are from CRSP.

Table II

Descriptive Statistics Comparison

Comparison of the descriptive statistics of my sample with the ones of Andrade et al. (2001) in terms of total number of mergers, percentage of payment by cash, stock, mixed, bidders per deal, median of the relative size of target over acquirer, relatedness of acquirer, and target industry and the median of the takeover premium.

	Our results	**Andrade et al. (2001) results**	
Years	1984-2000	1980-1989	1990-1998
N	1,462	1,427	2,040
All cash	39.3%	45.3%	27.4%
All stock	40.9%	32.9%	57.8%
Mixed	19.8%	12.7%	13.1%
Bidders/Deal	1.1	1.2	1
Relative size (median)	11.9%	13.3%	11.2%
Same industry	57.5%	40.1%	47.8%
Premium (median)	32.3%	37.7%	34.5%

As table II shows, data are consistent with Andrade et al. (2001).

As already stated I exclude from my sample the finance, insurance, and real estate industries. Due to all the restriction imposed, in the sample there are no mergers made by acquirers in the agriculture, forestry and fishing industry. Table III reports the breakdown of the sample by acquirer's industry, based on the SIC codes.

Table III

Industries

Breakdown of the 1,462 mergers by acquirer's industry, based on the SIC codes.

Industry	**Percentage (%)**
Mining	4.17
Construction	0.69
Manufacturing	48.8
Transportation	2.53
Communications	6.90
Utilities	5.60
Retail Trade	6.36
Wholesale Trade	3.84
Services	20.93

The reliability of results of this study rests upon the empirical proxies I propose to measure the investment opportunities and the market misvaluation. Investment opportunities are measured by the level of post mergers capital expenditures and market misvaluation by Tobin's Q.

The subparagraphs II.A and II.B explain how the capital expenditures and the Tobin's Q are measured and provide some additional statistics. Subparagraphs II.C, II.D, II.E, provide measures and descriptive statistics of additional variables that I will use in my multivariate analysis.

The methodology followed to calculate capital expenditures, Tobin's Q, and liquidity measures is based on Kaplan and Zingales (1997). Accounting data are from COMPUSTAT.

II.A Measure of Investment Opportunities

In this study the proxy used for investment opportunities is the level of post merger investments. Specifically the level of a firm's investments is calculated as the ratio of the capital expenditures (Compustat item 128) over the assets (item 6).

I examine the above ratio of the capital expenditures over the assets (C/A) in the four years before and after the merger respectively for the acquirer and the merged entity. The aim of the analyses provided in this subparagraph is to show that the level of capital expenditures is stable before and after the merger and seems to follow a predetermined path, rather than a random one.

Table IV shows the average of the C/A ratio four years before and after the merger, by industry.

Table IV

Level of investments pre and post merger

Mean of the four years before and after the merger of C/A of the acquirer and merged entity respectively, by industry

	Mining	**Constr**	**Manuf.**	**Transp.**	**Commun.**	**Utilities**	**Retail Trade**	**Wholesale Trade**	**Services**
C/A (4 years before the merger mean)	0.133	0.041	0.062	0.124	0.086	0.070	0.081	0.031	0.065
C/A (4 years after the merger mean)	0.096	0.025	0.047	0.088	0.074	0.059	0.069	0.033	0.048

Table VI illustrates the ratio C/A in each of the four years before and after the merger respectively for the acquirer and merged entity. C/A_m1 is the ratio measured one year before the merger, C/A_m2 is the ratio measured two years before the merger and so on. C/A_p1 is the ratio measured one year after the merger, C/A_p2 is the ratio measured two years after the merger and so on.

Table V

Level of investments pre and post merger by calendar year

Ratio C/A in each of the four years before and after the merger respectively for the acquirer and merged entity. C/A_m1 is the ratio measured one year before the merger, C/A_m2 is the ratio measured two years before the merger and so on. C/A_p1 is the ratio measured one year after the merger, C/A_p2 is the ratio measured two years after the merger and so on.

CA_m1	**CA_m2**	**CA_m3**	**CA_m4**
0.064	0.068	0.071	0.070
CA_p1	**CA_p2**	**CA_p3**	**CA_p4**
0.059	0.055	0.050	0.047

Table V shows that the level of the ratio C/A is pretty stable for the four years before the merger. The ratio slightly decreases during the four years, but there is no sudden drop. After the merger the C/A ratio of the merged entity is lower than before the merger. The level of the C/A ratio in the four years after the merger is again stable and slightly decreasing.

The strong link between subsequent years of the C/A ratio in the four years before and after the merger is further examined in Tables VI and VII. The Tables present results of the regressions of acquirers ratio C/A_t on the one year before value (CA_{t-1}). Regressions are run for the four years before and after the merger.

Table VI

Regressions of the C/A ratio between subsequent years before the merger

Regressions of the acquirers ratio C/A_t on the one year before value (CA_{t-1}). Regressions are run for the four years before the merger. C/A_m1 is the ratio measured one year before the merger, C/A_m2 is the ratio measured two years before the merger and so on.

Y	X	Coef.	St error	t	N
C/A_m1	C/A_m2	0.728	0.020	35.760	1373
C/A_m2	C/A_m3	0.659	0.023	27.710	1286
C/A_m3	C/A_m4	0.746	0.024	30.970	1223

Table VII

Regressions of the C/A ratio between subsequent years after the merger

Regressions of the merged entity ratio C/A_t on the one year before value (CA_{t-1}). Regressions are run for the four years after the merger. C/A_p1 is the ratio measured one year after the merger, C/A_p2 is the ratio measured two years after the merger and so on.

Y	X	Coef.	St error	t	N
C/A_p2	C/A_p1	0.744	0.021	34.200	1343
C/A_p3	C/A_p2	0.735	0.019	37.470	1254
C/A_p4	C/A_p3	0.745	0.020	36.690	1140

II.B Measure of Market Misvaluation

As stated, the Tobin's Q can be either a proxy for the misvaluation and/or the investment opportunities of the firm. In my study I use the acquirer Tobin's Q as a measure of the market misvaluation: the level of capital expenditures (proxy for investment opportunities) should be able to capture the part of the Tobin's Q that represents the investment opportunities and leave the sole meaning of market misvaluation to the variable.

Tobin's Q is calculated as market value of the assets divided by the book value of assets (Compustat item 6), where the market value of the asset equals the book value of the assets, plus the market value of common equity less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74).

Table VIII shows the acquirer's mean of the Tobin's Q four years before the merger and the acquirer's Tobin's Q one year before the merger, by industry.

Table VIII

Tobin's Q

Acquirer's mean of Tobin's Q four years before the merger and Tobin's Q of the acquirer one year before the merger, by industry.

	Mining	Constr.	Manuf.	Transp.	Commun.	Utilities	Retail Trade	Wholesale Trade	Services
Acquiring Tobin's Q (4 years mean)	1.60	1.67	2.21	1.31	1.98	1.31	1.80	1.64	3.12
Acquiring Tobin's Q (1 year before)	1.51	1.85	2.28	1.21	2.02	1.31	1.86	1.60	3.09

It is important to analyze the level of Tobin's Q of the acquirer one year before the merger, since the market misvaluation theory states that managers decide the method of payment in mergers (and the timing of merger) based on the overvaluation of their firm done by the market in the period before the merger. Managers almost choose the exact moment to effect the merger, timing the market. Hence, in my analysis I have to take into account the average level of market valuation in the years before the merger as well as the market valuation of the firm in the nearest period (one year) before the merger.

An alternative measure of the misvaluation is the long run stock returns. If a firm is mispriced, when the misvaluation is corrected the firm's stock will earn abnormal return. Therefore, the long-run abnormal return can be a proxy for the misvaluation. Nevertheless, the proxy has been criticized, since there is much disagreement about how to interpret long run post event returns. They might be, for example, the rational risk premia. "A huge benefit of test based on contemporaneous measures of misvaluation is that they do not require drawing inferences from stock returns occurring years after the takeover event" Dong et al. (2006).

II.C Liquidity Measures

The choice of the method of payment can be affected by liquidity constraints of the firm. As a measure of liquidity constraints I use four different variables, usually adopted by the literature: cash flow, leverage, cash and cash dividends.

However, the use of the cash dividends as a measure of liquidity constraints has been criticized. Another interpretation, which can be assigned to this variable, is the opposite meaning of the ratio C/A. Firms with low investment opportunities prefer to give their cash flow to investors, instead of saving it for future investments. I deflate cash flow, cash and cash dividend by the assets.

The level of cash flow is measured as the ratio of cash flow over assets (Compustat item 6). Cash flow is measured as the sum of earning before extraordinary items (item 18), and depreciation (item 14).

The leverage (Leverage) is measured as the ratio of debt to capital. Debt is the sum of the book value of short term debt and long term debt (items 9 and 34), while total capital is the sum of debt, book value of preferred stock (item 130), and book value of common equity (item 60).

The cash availability (Cash/A) is measured as the ratio of cash and short term investments (item 1) and assets.

The fourth proxy for the liquidity constraint is the level of cash dividend (CDiv/A). The variable is measured as the ratio of cash dividends (item 26) and assets.

Table IX provides some descriptive statistics of the proxies for liquidity constraints. Specifically the table shows the mean of acquirer's proxies of liquidity constraints for the four years before the merger and value of the proxies one year before the merger (for the same reason explained in the Tobin's Q analysis) by industry. Data are shown only for the pre merger period since it is the *pre* and not the *post* level of liquidity constraints that should affect the choice of method of payment in mergers.

II.D Risk Sharing Hypothesis and Relative Size

Among the variables that can affect the method of payment there is the relative size of the target compared to the acquirer. A relative big target compared to the acquirer would probably lead to a stock merger instead of a cash one. Raising enough cash to buy a target of similar size seems not likely to happen.

However, the relative size of the target to the acquirer has been used to control for the risk-sharing hypothesis (see Martin, 1996). The risk sharing hypothesis is based on the asymmetric information between target and bidder (Hansen, 1987). The bidder would choose stock as a method of payment if the target identifies better its value than does the bidder. Choosing a stock merger the acquirer would benefit from any post-acquisition revaluation result.

Table IX

Measure of liquidity constraints

Mean of acquirer's proxies of liquidity constraints (leverage, ratio of cash flow over asset (CF/A), ratio of cash and short term investments over assets (Cash/A), ratio of cash dividend over assets (CDiv/A)) for the four years before the merger and value of the proxies one year before the merger, by industry.

	Mining	**Constr**	**Manuf.**	**Transp.**	**Commun.**	**Utilities**	**Retail Trade**	**Wholesale Trade**	**Services**
CF/A (4 years before the merger mean)	0.096	0.062	0.101	0.101	0.066	0.071	0.082	0.069	0.092
CF/A (1 year before)	0.100	0.048	0.103	0.092	0.066	0.076	0.086	0.071	0.094
Leverage (4 years before the merger mean)	0.368	0.453	0.293	0.429	0.461	0.505	0.344	0.374	0.254
Leverage (1 year before)	0.390	0.463	0.303	0.418	0.465	0.515	0.344	0.363	0.264
Cash/A (4 years before the merger mean)	0.072	0.077	0.132	0.095	0.102	0.031	0.092	0.078	0.223
Cash/A (1 year before)	0.069	0.052	0.127	0.082	0.099	0.048	0.077	0.082	0.204
CDiv/A (4 years before the merger mean)	0.015	0.002	0.015	0.009	0.014	0.018	0.010	0.009	0.007
CDiv/A (1 year before)	0.013	0.003	0.015	0.008	0.012	0.018	0.008	0.008	0.005

The problem of asymmetric information should be larger as the value of the target increase compared to the acquirer's one. Hence, the use of stock as a method of payment should be more likely to take place as the size of the target increase compared to the acquirer's one. Thus, to control for the risk sharing hypothesis I use the relative size of the target compared to the acquirer (Rsize), measured as the ratio of the market value of the target over the market value of the acquirer, both calculated twenty days before the announcement of the merger.

Table X shows the relative size of the target compared to the acquirer, by industry.

Table X

Measure of relative size of the target compared to the acquirer

Relative size of the acquirer compared to the target (RSize) measured as the market value of the target over the market value of the acquirer both calculated twenty days before the merger announcement.

	Mining	Constr	Manuf.	Transp.	Commun.	Utilities	Retail Trade	Wholesale Trade	Services
Rsize	0.358	0.374	0.215	0.265	0.232	0.345	0.237	0.291	0.230

II.E Mergers

Table XI shows the total number of mergers made by an acquirer in the eleven years time window (five years before and after the merger analyzed) including the merger studied. 2Mergers means that the firm has made two mergers, 3Mergers three mergers, 4Mergers four mergers, 5to7Mergers five to seven mergers and Over7Mergers more than 7 mergers. Data are shown by acquirers' industries.

It is interesting how many mergers have been made by single acquirers in eleven years. Almost 24% of the firms analyzed have made at least two mergers, 14% three mergers, and, amazingly, near 5% more than 7 mergers.

The total number of mergers made by a firm would probably affect the way of payment in the takeover analyzed. It might be unlikely that an acquirer will buy more than seven firms with cash, unless their size is very small. Hence, I decide to analyze the effect of the number of mergers done by a single acquirer on the method of payment in takeovers and to introduce the variables (2Mergers, 3Mergers, 4Mergers, 5to7Mergers, Over7Mergers) in the multivariate analysis.

Table XI

Mergers

Total number of mergers made by an acquirer in the eleven years time-window (five years before and after the merger analyzed) including the merger studied. 2Mergers means that the firm has made two mergers, 3Mergers three mergers, 4Mergers four mergers, 5to7Mergers five to seven mergers and Over7Mergers more than 7 mergers. Data are shown by acquirers' industries.

	Mining (%)	**Constr (%)**	**Manuf. (%)**	**Transp (%).**	**Commun. (%)**	**Utilities (%)**	**Retail Trade (%)**	**Wholesale Trade (%)**	**Services (%)**
2Mergers	34.42	20.0	22.4	21.6	21.7	28.0	29.0	19.6	23.2
3Mergers	4.92	30.0	11.4	29.7	12.8	12.1	16.1	33.9	15.3
4Mergers	9.83	0.0	9.1	0.0	11.8	9.7	0.0	3.5	6.2
5to7Mergers	0.0	0.0	11.3	0.0	7.9	0.0	0.0	12.5	6.5
Over7Mergers	0.0	0.0	2.5	0.0	22.7	8.5	0.0	0.0	7.5

III. UNIVARIATE ANALYSIS

This section presents the relationship between proxies for investment opportunities and market misvaluation, and method of payment in mergers; multivariate findings are reported in section IV. Section V discusses the most robust findings of both analyses.

As a first step to test Myers' theory in the context of mergers, in section III.A I study if my proxy for the investment opportunities, i.e. the C/A ratio, is different for cash and stock merger. According to Myers' theory, firms with high investment opportunities should make stock mergers.

Previous studies have used Tobin's Q as a proxy either for the investment opportunities or for market misvaluation. In both cases, the level of Tobin's Q is higher in stock mergers than in cash mergers. In section III.B I check if I obtain the same results in my sample.

III.A Capital Expenditures in Cash and Stock Mergers

I measure the four years before the merger average C/A of the acquirer ($\overline{CA}_{acquirer\_before}$ henceforth) and the four years after the merger average C/A of the merged entity ($\overline{CA}_{merged\_after}$ henceforth). Table XIII reports the t-test of $\overline{CA}_{acquirer\_before}$ between cash acquirers and stock acquirers, and the t-test of $\overline{CA}_{merged\_after}$ between merged entities that have used cash and merged entities that have used stock as a method of payment.

I aggregate the stock and mixed mergers (as Andrade et al., 2001), and I classify both stock and mixed mergers as stock mergers in any further analysis, if not otherwise stated.

Table XII

Method of payment and investments

$\overline{CA}_{acquirer\_before}$ and $\overline{CA}_{merged\_after}$ for cash and stock mergers. T-statistics are reported in parentheses.

Method of payment	Acquirer average C/A (4y before merger)	Merged entity average C/A (4y after merger)	
	Mean	Mean	N
Stock (0)	0.071	0.056	888
Cash (1)	0.066	0.050	574
All	0.069	0.054	1462
Mean difference (Stock-Cash)	0.005**	0.005***	
t-stat	(2.265)	(2.954)	

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

The $\overline{CA}_{acquirer\_before}$ of cash acquirers is significantly lower if compared to the $\overline{CA}_{acquirer\_before}$ of stock acquirers. Specifically, before the mergers, the $\overline{CA}_{acquirer\_before}$ is 0.071 for the stock mergers and 0.066 for the cash ones. The mean difference in the two subsamples is 0.005 (whole sample average 0.069), significant at the 0.05 level.

Furthermore the $\overline{CA}_{merged\_after}$ of the "new firm" is significantly lower for the merged entities that have used cash as a method of payment than the ones that have used stock. In particular, after the merger $\overline{CA}_{merged\_after}$ is 0.056 for stock mergers and 0.050 for cash ones. The mean difference in the two subsamples is 0.005 (whole sample average 0.054), significant at the 0.01 level

Findings are as expected and are not significantly different for the years before and after the merger.

Result 1: the four years after the merger average of the ratio of capital expenditures over the assets is significantly higher for stock mergers than for cash ones.

Result 2: the four years before the merger average of the ratio of capital expenditures over the assets is significantly higher for stock mergers than for cash ones.

The level of capital expenditures is not always available in each of the four years before and after the merger: accounting data are sometimes missing in Compustat for the 9 years time window chosen. Furthermore, it is interesting to analyze if in each single year the level of C/A is significantly higher for the stock mergers than for the cash ones, and to study in which years the difference is more significant. I am particularly interested in the level of C/A *post* merger, since, as I stated, my proxy for the investment opportunity of a firm is the $\overline{CA}_{merged\_after}$. It is therefore important to analyze the significance of the difference of the C/A ratio for stock or cash merger especially after the merger.

Hence, I run a difference of mean for each of the four years before and after the merger. Results are reported in tables XIII and XIV.

As shown in Table XIII, the level of the C/A ratio for stock acquirers is significantly higher than for cash acquirers at the 0.1 level in the two years before the merger, and at the 0.05 level in the third year before the merger. Hence, the difference of the $\overline{CA}_{acquirer\_before}$ between stock and cash mergers is mainly driven by the three years before the event.

As reported in Table XIV, after the mergers the level of the C/A ratio for stock merged entities is significantly higher than for cash merged entities at the 0.01 level in the first and second year, at the 0.05 in the third year and at the 0.1 in the fourth year after the merger. Hence, as for the $\overline{CA}_{acquirer\_before}$ the difference of the $\overline{CA}_{merged\_after}$ between stock and cash mergers is mainly driven by the years nearest the event. The mean differences for each year are more significant when studying the $\overline{CA}_{merged\_after}$ .than the $\overline{CA}_{acquirer\_before}$.

Result 3: the ratio of the capital expenditures over the assets is significantly higher for stock mergers than for cash ones in each of the three years before the merger (at different levels) and in all the four years before the merger (at different levels).

Table XIII

Method of payment and investments in each year before the merger

C/A ratio of the acquirer for *each* of the 4 years before the merger for cash and stock mergers. T-statistics are reported in parentheses.

Method of payment	Year m1		Year m2		Year m3		Year m4	
	Mean	N	Mean	N	Mean	N	Mean	N
Stock (0)	0.066	884	0.070	840	0.074	768	0.071	724
Cash (1)	0.062	567	0.066	541	0.068	523	0.069	506
All	0.064	1,451	0.068	1,381	0.071	1,291	0.070	1,230
Mean difference (Stock-Cash)	0.003*		0.004*		0.006**		0.002	
t-stat	(1.687)		(1.727)		(2.386)		(1.015)	

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

Table XIV

Method of payment and investments in each year after the merger

C/A ratio of the merged entity for *each* of the 4 years after the merger for cash and stock mergers. T-statistics are reported in parentheses.

Method of payment	Year p1		Year p2		Year p3		Year p4	
	Mean	N	Mean	N	Mean	N	Mean	N
Stock (0)	0.061	878	0.057	822	0.051	765	0.048	689
Cash (1)	0.055	567	0.051	529	0.047	495	0.045	460
All	0.059	1,445	0.055	1,351	0.050	1,260	0.047	1,149
Mean difference (Stock-Cash)	0.006***		0.006***		0.004**		0.003*	
t-stat	(2.845)		(3.096)		(2.065)		(1.874)	

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

III.B Tobin's Q in Cash and Stock Mergers

Previous studies have found that the acquirer Tobin's Q (either interpreted as investment opportunities or as market misvaluation) and similar proxies (price over book ratio of the equity) are significantly lower for cash mergers than for stock ones (see Martin, 1996, Dong et al., 2006). As a check, I examine if in my sample the acquirer's Tobin's Q is higher for stock mergers than for cash ones.

Specifically, I run a t-test of the four years before the merger average of the acquirer's Tobin's Q between cash and stock mergers. I also run a t-test of the one year before the merger Tobin's Q of the acquirer again for cash and stock mergers. It is important to study the level of Tobin's Q even in the year before as already stated in the Data section.

Results are reported in table XV.

Table XV

Method of payment and Tobin's Q

Four years before the merger average of the acquirer's Tobin's Q for cash and stock acquirers and one year before the merger measure of the acquirer's Tobin's Q for cash and stock acquirers. T-statistic are reported in parentheses.

Method of payment	**Acquirer average Q (4y before merger)**	**Acquirer Q (year before the merger)**	
	Mean	**Mean**	**N**
Stock (0)	2.506	2.538	792
Cash (1)	1.842	1.862	526
All	2.241	2.266	1,318
Mean difference (Stock-Cash)	0.664	0.675	
t-stat	(8.718)***	(7.925)***	

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

The four years before the merger average Tobin's Q of stock acquirers is 2.506, significantly higher than the one of cash acquirers (1.842). The mean difference is 0.664, significant at the 0.01 level.

Result 4: the four years before the merger average of the Tobin's Q of stock acquirers is significantly higher than the one of cash acquirers.

The one year before the merger Tobin's Q of stock acquirers is 2.538, significantly higher than the one of cash acquirers (1.862). The mean difference is 0.675, significant at the 0.01 level.

Result 5: the one year before the merger Tobin's Q of stock acquirers is significantly higher than the one of cash acquirers.

Results are consistent with the findings of Martin (1996), Dong et al. (2006). Firms with higher investment opportunities/market misvaluation are characterized by higher Tobin's Q.

IV. MULTIVARIATE ANALYSIS

In the previous section, I analyzed the relation between the investment opportunities and the method of payment in mergers with a univariate analysis. In this section my second step to test Myers' theory is the study of both the impact of the investment opportunities and of the market misvaluation together on the method of payment. Using the post merger investments I can distinguish the impact of investment opportunities (proxied by post merger capital expenditures) from the impact of market misvaluation (proxied by the acquirer's Tobin's Q effect not captured by the capital expenditures) on the choice of the method of payment in mergers. Furthermore, the multivariate analysis allows me to control for several other variables that might affect the choice of the method of payment.

IV.A Model and Variables

I perform a multivariate analysis and specifically a logistic regression. This kind of regression with binary dependent variable allows me to understand the impact of investment opportunities on the method of payment. The dependent variable is a dummy (*Method*) 0 if the method of payment is stock and 1 if it is cash.

As independent variables, in the regression I introduce the level of the investment opportunities (i.e. the four years after the merger average of the ratio of the capital expenditures over the assets, the $\overline{CA}_{merged\_after}$). Furthermore, I introduce, as independent variables, the Tobin's Q of the acquirer and several control variables (pre merger acquirer's level of cash flow, of cash, of cash

dividend and leverage, relative size of the target, relatedness of the two merging firms in term of sector, and industry of the acquirer).
Hence, my model is the following:

$$Method_i = \beta_0 + \beta_1(\overline{CA}_{merged\_after})_i + \beta_2 AcqQ_i + \beta_3(CF/A)_i + \beta_4 Leverage_i + \beta_5(Cash/A)_i + \beta_6(CDiv/A)_i + \beta_7 RSize_i + B_8 \mathrm{Re}l\sec t_i + \beta_9 Industries_i + \varepsilon_i$$

With i= 1…1,462 number of mergers;
Method= dummy 0 if the method of payment is stock and 1 if it is cash.

The method followed to measure the variables is described in the Data section. Below I explain my expectations in terms of signs of the variables. Table XVI summarizes the variables, their method of measurement, and the expected signs of the coefficients.

The expected signs of the variables coefficients in the regressions are the following:

- $\overline{CA}_{merged\_after}$ = level of investment opportunities. I expect a negative and significant coefficient: higher investment opportunities should lead to stock merger.
- AcqQ= four years before the merger average Tobin's Q of the acquirer. The variable, as I said before, has an ambiguous interpretation (either investment opportunities or misvaluation, see Dong et al., 2006). In both cases a higher Tobin's Q should be associated with stock merger, hence I expect a negative and significant coefficient for this variable.
- CF/A= level of pre merger cash flow of the acquirer. CF/A is the first of my measure of liquidity constraints of the acquirer. The higher the level of

cash flow, the lower the liquidity constraints, the higher the chance that the firm is able to make a cash merger. Therefore, I expect a positive coefficient for this variable.

- Leverage= pre merger leverage of the acquirer. Leverage is the second measure of the liquidity constraints. A firm with a high level of debt compared to equity would not prefer to make cash merger, to borrow funds and further increase the level of leverage. Hence, I expect a negative coefficient for this variable.
- Cash/A= pre merger level of cash and short term investments of the acquirer. The variable is the third proxy for the liquidity constraints. A firm with high level of cash might be more willing to make a cash merger. Therefore, I expect a positive coefficient for this variable.
- CDiv/A=pre merger level of cash dividends of the acquirer. The ratio of the cash dividends over the assets can be interpreted as a measure of liquidity constraints, although this interpretation has been criticized. Otherwise, the variable can have the opposite meaning of the ratio C/A (lower investment opportunities). Hence, firms with low investment opportunities prefer to give their cash flow to investors, instead of saving it for future investments. I expect a positive coefficient for this variable.
- RSize= relative size of the target compared to the acquirer. I introduce the relative size of the target compared to the acquirer to control for the risk sharing hypothesis (see Martin, 1996, Hansen, 1987). Moreover, a simpler interpretation of the variable is that the bigger the target firm compared to the acquirer the less possible would be for the acquirer to raise enough cash to buy the target shares. Both interpretations would lead to an expected negative coefficient for this variable.
- Relsect= the level of relatedness in term of sector of the acquirer and the target. I have no expectation for this variable in terms of sign of the coefficient.

- Industries= industry of the acquirer. I introduce dummies of the acquirer's industry to control for the industry effect. I have no expectation for those variables in terms of signs of the coefficients.

Table XVI

Independent variables

Variable Name	Variable	Method of measurement	Expected sign
$(\overline{CA}_{merged\_after})$	Level of capital expenditures after the merger. Proxy for investment opportunities of the merged entity.	Average of the four years after the merger of the ratio of the capital expenditures (Compustat item 128) over the assets (item 6) of the merged entity.	-
AcqQ	Tobin' Q of the acquirer. Proxy for market misvaluation.	Average of the four years before the merger of the Tobin's Q of the acquirer. Tobin's Q is calculated as market value of the assets divided by the book value of assets (Compustat item 6), where the market value of the asset equals the book value of the assets plus the market value of common equity less the sum of the book value of common equity (item 60) and the balance sheet deferred taxes (item 74).	-
CF/A	Level of cash flows of the acquirer before the merger. Proxy for liquidity constraints.	Average of the four years before the merger of the cash flow over the assets (Compustat item 6) of the acquirer. Cash flow is measured as the sum of earning before extraordinary items (item 18), and depreciation (item 14).	+
Leverage	Leverage of the acquirer. Proxy for liquidity constraints.	Average of the four years before the merger of the leverage of the acquirer. Leverage is measured as the ratio of debt to capital. Debt is the sum of the book value of short term debt and long term debt (Compustat items 9 and 34), while total capital is the sum of debt, book value of preferred stock (item 130), and book value of common equity (item 60).	-
Cash/A	Cash availability of the acquirer. Proxy for liquidity constraints.	Average of the four years before the merger of the ratio of cash and short term investments (Compustat item 1) over assets (item 6) of the acquirer.	+

CDiv/A	Level of cash dividend of the acquirer. Proxy for liquidity constraints.	Average of the four years before the merger of the ratio of cash dividends (item 26) over the assets (item 6) of the acquirer.	+
RSize	Relative size of the target compared to the acquirer.	Market value of the target over the acquirer both calculated twenty days before the merger announcement.	-
Relsect	Level of relatedness in term of sector of the acquirer and the target.	Dummy variable 1 if the first two digits of the acquirer SIC code are the same of the first two digits of the target (related sector), 0 otherwise (unrelated sector).	?
Mining, Construction, Transportation, Communication Utilities, Retail Trade, Services, Wholesale Trade, Manufacturing	Industry of the acquirer.	Dummies for industries of the acquirers. The benchmark industry dummy is the manufacturing one.	?

The following part of this section is subdivided in 3 subsections:

- In the subsection IV.B I present the results of my multivariate analysis, following the above mentioned model (Table XVII). Furthermore, I run a logistic regression using the Tobin's Q and the liquidity constraints of the acquirer calculated in the one year before the merger instead of in the four years before the merger (Table XVIII).
- In the subsection IV.C I run the same regression of section IV.A controlling for the effect of multiple mergers made by the acquirers (Tables XIX-XX).
- In the subsection IV.D I perform the same regressions of section IV.A in a reduced sample which includes only the acquirers that have done one merger (Table XXI-XXII).

IV.B Logistic Regression

Table XVII shows the results of three logistic regressions. In the first I do not consider the time fixed effect and I do not control for industries. In regression 2 I introduce dummies of calendar years for the time fixed effect and in regression 3 I add dummies of the acquirer's industry to control for the industry effect.

The measure used as proxy for the investment opportunities is significant at the 0.01 level with a negative coefficient in all the three regressions, thus confirming that firms with higher investment opportunities prefer to use stock as a method of payment. Tobin's Q, the proxy for market misvaluation, has a negative and significant (at the 0.01 in all the three regressions) coefficient: firms that are overvalued prefer to use stock as a method of payment instead of cash. I interpret the significance of both the coefficient of the capital expenditure and the Tobin's Q as the sign of a coexistence of two effects that are not mutually exclusive: the investment opportunities and the market misvaluation.

Among the proxy for the liquidity constraints the level of acquirer's cash flow is significant with a positive coefficient (as expected) in all the three regressions shown. Leverage is significant with a positive coefficient in the third regression. The other proxies for liquidity constraints are not significant.

The relative size of the target compared to the acquirer is significant at the 0.01 level with an expected positive coefficient in all the three regressions.

The relatedness in terms of acquirer and target industry is significant in the first two regressions (at the 0.05 and at the 0.1 level) with a negative coefficient. The variable looses its significance when I add the industry dummies, thus revealing that those latter variables are the true drivers.

Finally, it seems that firms in mining, communication, utilities and services industries are less inclined to use cash as a method of merger. The finding is interesting and certainly requires further research.

In Table XVIII I run a logistic regression similar to the one shown in table XVII, this time using the Tobin's Q and the liquidity constraints of the acquirer calculated in the one year before the merger instead of in the four years before the merger.

In this case I use the value of the variable measured as close as possible to the merger. As explained in the Data section for Tobin's Q, it might be that the values that those variables reach in the year before the merger have a strong effect on the choice of payment. Regarding the Tobin's Q a high overvaluation in the year before the merger might lead the manager to use stock as a method of payment. On the other side a shortage of liquidity in the year before the merger might force the firm not to use cash as a method of payment.

Hence, I introduce in the regression the following "new" independent variables (the independent variable RSize, Relsect and the industries remain as in the previous regression): AcqQ_m1, CF/A_m1, Leverage_m1, Cash/A_m1 and CDiv/A_m1 are respectively acquirer's Tobin's Q, ratio of cash flows over assets, leverage, ratio of cash and short term investments over assets, and ratio of cash dividends over assets 1 year before the merger. As in table XVII I run three regressions: in regression 2 I add dummies for calendar years to control for the time fixed effect and in regression 3 I add industry dummies.

Results seem to confirm the findings shown in table XVII: the capital expenditures after the merger are significant in all the three regressions at the 0.01 level, with a negative coefficient, as expected. The acquirer's Tobin's Q one year before the merger is again significant at the 0.01 level with a negative coefficient, as expected. The cash flows ratio is significant at the 0.01 level in all the three regressions with positive coefficient, as expected. Leverage is significant in the first regression at the 0.1 level (with a positive coefficient) and in the third regression at the 0.05 level (with a positive coefficient), but not in the second one. The sign of the coefficient of leverage (positive, although I expected a negative one) and the fact that the variable becomes again significant in the

regression with the industry dummies suggest that there might be an interaction between the effect of this variable and the acquirer's industry.

However, my proxy for the investment opportunities remains significant in all the specifications.

Table XVII

Logistic Regressions A

Logistic regression with dummy dependent variable 0 if the method of payment is stock and 1 if it is cash. $\overline{CA}_{merged\_after}$ is the 4 years after the merger average of the ratio of capital expenditures over assets of the merged entity. AcqQ, CF/A, Leverage, CDiv/A are respectively the 4 years before the merger average of the acquirer's 1) Tobin's Q, 2) ratio of cash flows over assets, 3) the ratio of debt to capital, 4) ratio of cash and short term investments over assets, 5) ratio of cash dividends over assets. RSize is the ratio of market value of the target over market value of the acquirer, both calculated twenty days before the merger announcement. Relsect is the relatedness in term of sector of acquirer and target. In regression 2 I add dummies for calendar years to control for the time fixed effect. In regression 3 I add dummies for industries.

	regression 1	**regression 2**	**regression 3**
Cons.	0.766	-1.821	-1.832
	(0.334)	(0.792)	(0.814)
$\overline{CA}_{merged\_after}$	-13.563***	-14.531***	-10.946***
	(2.242)	(2.411)	(2.634)
Acq Q	-0.704***	-0.626***	-0.611***
	(0.085)	(0.089)	(0.090)
CF/A	11.812***	11.880***	10.964***
	(1.825)	(1.846)	(1.856)
Leverage	0.637	0.587	1.024**
	(0.451)	(0.463)	(0.480)
Cash/A	0.427	0.010	0.071
	(0.670)	(0.708)	(0.760)
CDiv/A	-0.113	-3.191	-1.214
	(4.343)	(4.650)	(4.900)
RSize	-1.106***	-1.190***	-1.061***
	(0.267)	(0.272)	(0.283)
Relsect	-0.322**	-0.259*	-0.145
	(0.127)	(0.136)	(0.139)
Mining			-1.882***
			(0.549)
Construction			-0.028
			(0.918)
Transportation			0.058
			(0.386)
Communication			-0.725**
			(0.303)
Utilities			-1.629***
			(0.384)
Wholesale Trade			0.164
			(0.366)
Retail Trade			-0.189
			(0.261)
Services			-0.492***
			(0.188)
Dummy for year of merger	N	Y	Y
N	1257	1257	1257
Pseudo R sq	0.131	0.180	0.208

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

Table XVIII

Logistic Regressions B

Logistic regression with dummy dependent variable 0 if the method of payment is stock and 1 if it is cash. $\overline{CA}_{merged\_after}$ is the 4 years after the merger average of the ratio capital expenditures over assets of the merged entity. AcqQ_m1, CF/A_m1, Leverage_m1, Cash/A_m1, CDiv/A_m1 are respectively the 1 year before the merger acquirer's 1) Tobin's Q, 2) ratio of cash flows over assets, 3) ratio of debt to capital, 4) ratio of cash and short term investments over assets, 5) ratio of cash dividends over assets. RSize is the ratio of the market value of the target over the market value of the acquirer, both calculated twenty days before the merger announcement. Relsect is the relatedness in term of sector of acquirer and target. In regression 2 I add dummies for the calendar years to control for the time fixed effect. In regression 3 I add dummies for industries.

	regression 1	**regression 2**	**regression 3**
	0.687	0.425	-1.885
	(0.310)	(0.552)	(0.781)
C/A after the merger	-14.176***	-15.107***	-11.349***
	(2.302)	(2.446)	(2.719)
Acq Q_m1	-0.620***	-0.572***	-0.570***
	(0.082)	(0.086)	(0.088)
CF/A_m1	10.254***	10.078***	9.292***
	(1.629)	(1.674)	(1.672)
Leverage_m1	0.698*	0.583	1.002**
	(0.404)	(0.418)	(0.434)
Cash/A_m1	0.305	0.125	0.211
	(0.599)	(0.625)	(0.656)
CDiv/A_m1	7.645*	4.367	7.089
	(4.654)	(4.988)	(5.467)
RSize	-1.375***	-1.456***	-1.331***
	(0.283)	(0.293)	(0.301)
Relsect	-0.249*	-0.200	-0.087
	(0.130)	(0.139)	(0.143)
Mining			-1.890***
			(0.537)
Construction			-0.598
			(1.399)
Transportation			0.316
			(0.408)
Communication			-0.802**
			(0.323)
Utilities			-1.613***
			(0.323)
Wholesale Trade			0.180
			(0.388)
Retail Trade			-0.173
			(0.388)
Services			-0.447***
			(0.194)
Dummy for year of merger	N	Y	Y
N	1196	1196	1196
Pseudo R sq	0.133	0.181	0.210

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

IV.C Logistic Regressions and Multiple Mergers

Multiple mergers might affect the choice of payment in mergers. If a firm makes subsequent mergers in a short time period it would be probably unlikely that the company would use cash as a method of payment, unless the targets acquired are very small and/or the firm has lot of liquidity. Moreover if the acquirer has made another merger in the year before the merger analyzed, it might lack the necessary liquidity to make a cash merger; on the other side if the firm has planned to make another merger in the year after the merger studied, it might be more willing to save money and make a stock merger.

In the Data section, I have presented some statistics about multiple mergers, and it seems likely that a firm has made several mergers (some of them more than seven) in the eleven years time period studied. Hence, my analysis might be biased by the fact that a firm has done multiple mergers. To control for this effect I run two sets of regressions shown in Tables XIX and XX.

In Table XIX I introduce in the regression 10 dummies to control for other mergers made by the acquirer (apart from the one analyzed) in each of the five years before and after the merger studied. For example, the dummy Merger_m1 has value 1 if the acquirer studied has made at least one merger on the year before the merger analyzed, 0 otherwise; the dummy Merger_m2 has value 1 if the acquirer studied has made at least one merger in the second year before the merger analyzed, 0 otherwise, and so on. The dummy Merger_p1 has value 1 if the acquirer studied has made at least one merger in the year after the merger analyzed, 0 otherwise; the dummy Merger_p2 has value 1 if the acquirer studied has made at least one merger in the second year after the merger analyzed, 0 otherwise, and so on.

I control for multiple mergers made by the same acquirer in the *five* years before and after the merger analyzed (although results are shown only for the *four* years before and after the merger).

In Table XIX I compare the results of the logit regressions previously run (see Table XVII) with the findings of the "new" logit regression in which I control for multiple regressions made in each single year.

Findings are similar to the ones of the previous regression. Among the dummies for other mergers made before or after the takeover the only significant (at the 0.1 level) is Merger_p1, with, as expected, negative coefficient.

However, it might be argued that it is the total number of mergers made by the firm that affects the method of payment. Therefore, in Table XX I introduce in the logistic regression dummies for the total number of mergers done by an acquirer in the eleven years. Specifically 2Mergers means that the firm has made two mergers, 3Mergers three mergers, 4Mergers four mergers, 5to7Mergers five to seven mergers and Over7Mergers more than 7 mergers.

In Table XX I compare the results of the logistic regression previously run (see Table XVII) with the findings of the "new" logistic regression in which I control for the total number of mergers made by the firm in the eleven years time-window.

Findings do not change and none of the dummies for the total number of mergers are significant[2]. Hence, results seem to be robust. However, it might be argued that both Table XIX and XX do not take into consideration the size of previous or subsequent mergers made by an acquirer before or after the merger analyzed. Hence, as a final step in my analysis I reduce the sample to the acquirers which have made only one merger in the eleven years.

[2] I have also run a logistic regression similar to the one shown in Table XX, although instead of the dummies 2Mergers, 3Mergers, 4Mergers, 5to7Mergers and Over7Mergers, I introduced a single dummy More1Merger equal to 1 if the firm has made more than one merger, zero otherwise. Results are similar to the one shown in table XX and the variable More1Merger is not significant.

Table XIX-Logistic Regressions C-Multiple Mergers

Dependent and independent variables are as in Table XVII. In regression 3 I add dummies to control for other mergers made by the acquirer (apart from the one analyzed) in each of the 4 years before and after the merger.

	regression 1	**regression 2**	**regression3**
Cons.	-1.821	-1.832	0.033
C/A after the merger	-14.531***	-10.946***	-11.337***
	(2.411)	(2.634)	(2.677)
Acq Q	-0.626***	-0.611***	-0.602***
	(0.089)	(0.090)	(0.092)
CF/A	11.880***	10.964***	11.104***
	(1.846)	(1.856)	(1.909)
Leverage	0.587	1.024**	1.071**
	(0.463)	(0.480)	(0.485)
Cash/A	0.010	0.071	-0.024
	(0.708)	(0.760)	(0.767)
CDiv/A	-3.191	-1.214	-0.795
	(4.650)	(4.900)	(4.898)
RSize	-1.190***	-1.061***	-1.084***
	(0.272)	(0.283)	(0.286)
Relsect	-0.259*	-0.145	-0.162
	(0.136)	(0.139)	(0.140)
Mining		-1.882***	-1.888***
		(0.549)	(0.558)
Construction		-0.028	-0.000
		(0.918)	(0.884)
Transportation		0.058	0.045
		(0.386)	(0.393)
Communication		-0.725**	-0.718**
		(0.303)	(0.313)
Utilities		-1.629***	-1.655***
		(0.384)	(0.384)
Wholesale Trade		0.164	0.145
		(0.366)	(0.364)
Retail Trade		-0.189	-0.193
		(0.261)	(0.266)
Services		-0.492***	-0.455**
		(0.188)	(0.190)
Merger_m4			0.006
			(0.294)
Merger_m3			0.053
			(0.265)
Merger_m2			-0.310
			(0.242)
Merger_m1			0.220
			(0.209)
Merger_p1			-0.331*
			(0.195)
Merger_p2			0.152
			(0.229)
Merger_p3			-0.025
			(0.245)
Merger_p4			-0.343
			(0.270)
Dummy for year of merger	Y	Y	Y
N	1257	1257	1257
Pseudo R sq	0.180	0.208	0.213

Table XX

Logistic Regressions D-Multiple Mergers

Dependent and independent variables are as in Table XVII. In regression 3 I add dummy variables for the total number of mergers made by the firm in the five years before and after the merger analyzed (2Mergers, 3Mergers, 4Mergers, 5to7Mergers, Over7Mergers).

	regression 1	**regression 2**	**regression 3**
Cons.	-1.821	-1.832	-1.885
C/A after the merger	-14.531***	-10.946***	-10.735***
	(2.411)	(2.634)	(2.668)
Acq Q	-0.626***	-0.611***	-0.605***
	(0.089)	(0.090)	(0.092)
CF/A	11.880***	10.964***	11.012***
	(1.846)	(1.856)	(1.863)
Leverage	0.587	1.024**	1.009**
	(0.463)	(0.480)	(0.483)
Cash/A	0.010	0.071	-0.001
	(0.708)	(0.760)	(0.769)
CDiv/A	-3.191	-1.214	-1.502
	(4.650)	(4.900)	(4.940)
RSize	-1.190***	-1.061***	-1.053***
	(0.272)	(0.283)	(0.288)
Relsect	-0.259*	-0.145	-0.152
	(0.136)	(0.139)	(0.140)
Mining		-1.882***	-1.938***
		(0.549)	(0.554)
Construction		-0.028	-0.037
		(0.918)	(0.904)
Transportation		0.058	0.052
		(0.386)	(0.388)
Communication		-0.725**	-0.733**
		(0.303)	(0.313)
Utilities		-1.629***	-1.656***
		(0.384)	(0.386)
Wholesale Trade		0.164	0.150
		(0.366)	(0.372)
Retail Trade		-0.189	-0.217
		(0.261)	(0.265)
Services		-0.492***	-0.500***
		(0.188)	(0.192)
2Mergers			0.151
			(0.176)
3Mergers			-0.005
			(0.213)
4Mergers			0.007
			(0.298)
5to7Mergers			-0.140
			(0.274)
Over7Mergers			0.012
			(0.319)
Dummy for year of merger	Y	Y	Y
N	1257	1257	1257
Pseudo R sq	0.180	0.208	0.209

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

IV.D Logistic Regressions and a Reduced Sample

To avoid bias due to multiple mergers, I study a reduced sample with acquirers that have made a single merger in the eleven years time-window analyzed. The reduced sample is made up of 614 mergers, of which 260 stock mergers, 229 cash mergers, and 125 mixed mergers. As before, I include the mixed mergers in the stock ones.

Table XXI compares results of the logistic regression run on the whole sample (already shown in Table XVII) and on the reduced one. Results are very similar confirming the significance of the investment opportunities proxy. The only variable that differs significantly is the relative size, which in the reduced sample is no more significant.

Table XXII compares the results of logistic regression run on the two samples although in this case, as in table XVIII, I use the one year before the merger (instead of the four year average) Tobin's Q and liquidity constraints proxies of the acquirer. Again Table XXII shows that results of the logistic regression run on the whole sample and on the reduced one are very similar. The only strong differences are the significance of cash dividend (significant at the 0.01) level, with a positive sign, as expected, and the non-significance of the relative size (as in regression shown in table XXI).

Table XXI

Logistic Regressions E-Reduced sample

Dependent and independent variables are as in Table XVII. In regression 1 I analyze the whole sample, while in regression 2 the reduced sample with acquirers that have made only one merger in the eleven years time-window analyzed.

	regression 1	**regression 2**
Cons.	-1.832	0.573
	(0.814)	(1.153)
C/A after the merger	-10.946***	-13.371***
	(2.634)	(4.380)
Acq Q	-0.611***	-0.970***
	(0.090)	(0.215)
CF/A	10.964***	14.826***
	(1.856)	(3.428)
Leverage	1.024**	1.745**
	(0.480)	(0.797)
Cash/A	0.071	0.087
	(0.760)	(1.263)
CDiv/A	-1.214	13.369
	(4.900)	(9.028)
RSize	-1.061***	-0.325
	(0.283)	(0.435)
Relsect	-0.145	-0.088
	(0.139)	(0.244)
Mining	-1.882***	-1.811**
	(0.549)	(0.804)
Construction	-0.028	-
	(0.918)	
Transportation	0.058	0.121
	(0.386)	(0.688)
Communication	-0.725**	-0.690
	(0.303)	(0.799)
Utilities	-1.629***	-3.908***
	(0.384)	(1.056)
Wholesale Trade	0.164	0.365
	(0.366)	(0.579)
Retail Trade	-0.189	-0.200
	(0.261)	(0.423)
Services	-0.492***	-0.718**
	(0.188)	(0.350)
Dummy for year of merger	Y	Y
N	1257	505
Pseudo R sq	0.208	0.317

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

Table XXII

Logistic Regressions F-Reduced sample

Dependent and independent variables are as in Table XVIII. In regression 1 I analyze the whole sample, while in regression 2 the reduced sample with acquirers that have made only one merger in the eleven years time-window analyzed.

	regression 1	**regression 2**
	-1.885	0.824
	(0.781)	(1.198)
C/A after the merger	-11.349***	-11.117***
	(2.719)	(4.174)
Acq Q_m1	-0.570***	-0.836***
	(0.088)	(0.215)
CF/A_m1	9.292***	11.138***
	(1.672)	(2.799)
Leverage_m1	1.002**	1.651**
	(0.434)	(0.728)
Cash/A_m1	0.211	0.305
	(0.656)	(1.130)
CDiv/A_m1	7.089	29.832***
	(5.467)	(10.667)
RSize	-1.331***	-0.631
	(0.301)	(0.450)
Relsect	-0.087	0.001
	(0.143)	(0.247)
Mining	-1.890***	-1.875**
	(0.537)	(0.786)
Construction	-0.598	-
	(1.399)	
Transportation	0.316	0.589
	(0.408)	(0.715)
Communication	-0.802**	-0.773
	(0.323)	(0.789)
Utilities	-1.613***	-3.887***
	(0.323)	(1.031)
Wholesale Trade	0.180	0.638
	(0.388)	(0.635)
Retail Trade	-0.173	-0.217
	(0.388)	(0.435)
Services	-0.447***	-0.614*
	(0.194)	(0.347)
Dummy for year of merger	Y	Y
N	1196	487
Pseudo R sq	0.210	0.301

***,**,* variables are significant at the 0.01, 0.05, 0.1 level

IV.E Summing up

In the present section, I have tried to understand the impact of investment opportunities on the method of payment, controlling for several variables. The level of capital expenditure post merger has been proved to be significant and negative as expected.

Furthermore, in this section I have run several logistic regressions to control for the robustness of the findings. I have changed the period of measure of some independent variables, I have controlled for time fixed effect, industries, multiple mergers (in different ways) and finally I have reduced the sample to acquirers that have made only one merger. My key variable, the proxy for the investment opportunities, has remained strongly significant and negative in all the specifications, proving the robustness of the results, which are discussed in the next section.

Result 6: firms with high (low) investment opportunities (average of the four years after the merger ratio of the capital expenditures over the assets, $\overline{CA}_{merged\_after}$ *) use stock (cash) as a method of payment in mergers.*

V. DISCUSSION

This section discusses the results presented in part in the Data section and above all in the Univariate Analysis, and Multivariate Analysis sections.

My purpose was to test Myers' theory in the context of mergers and, in brief, to demonstrate that acquirers who have high investment opportunities prefer to make stock mergers instead of cash ones. Managers choose not to burden the firm with debt, otherwise some of the gain from the company future investments will accrue to existing creditors. In this case, the managers, in order not to damage shareholders, will not (or will be less inclined to) make additional investments. As a consequence, firms that have access to many investment opportunities (i.e. firms that have real growth options) would tend to make less use of debt and, in the case of merger, to use stock as a method of payment.

To test this theory I have followed three steps, specifically:

1) To provide further empirical support to my proxy of the investment opportunities. The empirical analysis is shown in the Data section;
2) To prove that firms which have high investment opportunities (i.e. high post merger level of investments) make stock mergers. The empirical analysis is shown in the Univariate Analysis section;
3) To control for different reasons that might drive the method of payment. The empirical analysis is shown in the Multivariate Analysis section.

Below I discuss each of the three points mentioned.

V.A Proxy for the Investment Opportunities: Discussion

The first problem in testing Myers' theory in the context of mergers is to find a good proxy for the investment opportunities. As I said, previous studies have already tested this theory using Tobin's Q. However this proxy can be used both for investment opportunities and for market misvalution. Hence, as a proxy for the investment opportunities I have proposed the level of post merger investments (specifically the four years post merger average of the ratio of capital expenditure over the assets, $\overline{CA}_{merged\_after}$) on the base of Lamont's (2000) results.

Lamont found that there is a high correlation between projected investments and actual investments made. Therefore, the post merger investment should be correlated with the investments that the manager planned to make after the merger, thus mirroring the investment opportunities that the manager thought the new merged entity would have.

According to this way of reasoning, post merger investments can be used as a proxy for investment opportunities. However, given that they should follow a plan made by managers before the mergers, I expect post merger investments to have a pretty stable pattern, without sudden drops. It is unlikely that a manager would plan levels of investments that change suddenly year by year.

Therefore, in the Data section I have studied the pattern of the capital expenditures before and after the merger. I found that the level of the investments measured by the ratio of the capital expenditures over the assets (C/A) is pretty stable for the four years before the merger. The ratio slightly decreases during the four years, but there is no sudden drop. After the merger, the C/A ratio of the merged entity is lower than before the merger. The level of the C/A ratio in the four years after the merger is again stable and slightly decreasing.

The strong link between subsequent years of the C/A ratio in the four years before and after the merger is further confirmed by the regressions of acquirers ratio C/A_t on the one year before value (CA_{t-1}) and by the regressions of

the merged entity C/A_t ratio on the one year before value (CA_{t-1}). The link between subsequent years is pretty strong.

Hence, the characteristics of post merger investments are consistent with the supposed predetermined pattern. The results support my decision to use the post merger investment as a measure of the investment opportunities.

Therefore, in my study the first important finding is that:

The level of the investments (ratio of the capital expenditures over the asset) is pretty stable in the four years before and after the merger and there is a strong link between investments in subsequent years in the four years before and after the merger.

The above finding supports the proxy chosen for the investment opportunities. The proxy will be *crucial* in my study.

V.B Univariate Analysis: Discussion

Given the proxy chosen, I had to find that the four years post merger average of the capital expenditures ($\overline{CA}_{merged\_after}$) is higher for firms that make stock mergers than for firms that make cash mergers. I have run a t-test of $\overline{CA}_{merged\_after}$ between the cash and stock mergers and the results confirm the hypothesis:

Result 1: the four years after the merger average of the ratio of capital expenditures over the assets is significantly higher for stock mergers than for cash ones.

Result 2: the four years before the merger average of the ratio of capital expenditures over the assets is significantly higher for stock mergers than for cash ones.

As stated in *result 2*, I have also run the t-test of the $\overline{CA}_{acquirer\_before}$ between cash and stock acquirer. It is pretty likely that a merged entity with high investment opportunities was, before the merger, an acquirer with high investment opportunities (although it might be not always true). Results confirm this hypothesis.

To further test the hypothesis that firms which have high investment opportunities make stock mergers, I have analyzed if in each single year the level of C/A is significantly higher for the stock mergers than for the cash ones, and in which years the difference is more significant. I was particularly interested in the level of C/A *post* merger, since, as I stated, my proxy for the investment opportunity of a firm is the $\overline{CA}_{merged\_after}$.

The t-test result was the following:

Result 3: the ratio of the capital expenditures over the assets is significantly higher for stock mergers than for cash ones in each of the three years before the merger (at different levels) and in all the four years before the merger (at different levels).

This third result confirms the hypothesis.

However, other variables, which were not taken into account in the t-test might influence the method of payment. Hence, as a last step, I have run a multivariate analysis.

Before the discussion of the multivariate analysis a final remark: I have checked if in my sample the Tobin's Q, the other proxy used as either investment opportunities or market misvaluation, is higher for stock acquirers than cash ones, as in previous studies (see Martin, 1996). Results 4 and 5 confirm previous works' findings.

Result 4: the four years before the merger average of the Tobin's Q of stock acquirers is significantly higher than the one of cash acquirers.

Result 5: the one year before the merger Tobin's Q of stock acquirers is significantly higher than the one of cash acquirers.

V.C Multivariate Analysis: Discussion

As a third and final step of my analysis I have run a logistic regression with dummy dependent variable 0 if the method of payment is stock and 1 if it is cash. As independent variables, in the regression I have introduced the proxy for the investment opportunities (i.e. the four years after the merger average of the ratio of capital expenditures over assets, the $\overline{CA}_{merged\_after}$). Furthermore, I have introduced, as independent variables, the Tobin's Q of the acquirer and several control variables (pre merger acquirer's level of cash flow, of cash, of cash dividend and leverage, relative size of the target, relatedness of the two merging firms in terms of sector, and industries of the acquirer).

Moreover, I have run several logistic regressions to control for the robustness of the findings. I have changed the period of measure of some independent variables, I have controlled for time fixed effect, industries, multiple mergers (in different ways) and finally I have reduced the sample studying only acquirers that have made one single merger.

The $\overline{CA}_{merged\_after}$ variable is significant and negative in all the specifications, proving to be a driver of the method of payment in mergers.

Result 6: firms with high (low) investment opportunities (average of the four years after the merger ratio of the capital expenditures over the assets, $\overline{CA}_{merged\_after}$ *) use stock (cash) as a method of payment in mergers.*

Hence, my hypothesis is proven.

The second variable relevant in my analysis is the Tobin's Q. The variable is significant in all the specification, with a negative sign. In my study I have used the acquirers' Tobin's Q as a measure of the market misvaluation: the level of capital expenditures (proxy for investment opportunities) should be able to capture the part of the Tobin's Q that represents the investment opportunities and leave the sole meaning of market misvaluation to the variable.

Hence, according to this interpretation of the Tobin's Q, the two theories (investment opportunities and market misvaluation) both contribute to explain the choice of the method of payment in mergers.

VI. CONCLUSIONS

The method of payment in mergers is driven by different causes. Among the most important there are the future investment opportunities of the merged entity.

In this work I have examined the effect of the investment opportunities on the method of payment in mergers using a sample of 1,462 completed U.S. mergers (both acquirers and targets are publicly traded U.S.- based firms) announced between 1984 and 2000.

In this study, the actual investments made by the merged entity are the proxy for the investment opportunities of the firm. Planned investments are strongly correlated with actual investments (see Lamont, 2000) and should be based on the investment opportunities that the manager believes the firm has. Hence, the actual investments of the merged entity should be a good proxy for the investment opportunities of the entity itself.

According to the results of the univariate and multivariate analysis I have run, firms with high (low) investment opportunities use stock (cash) as a method of payment in mergers.

In the univariate analysis I have performed, firms that make stock mergers have a higher level of post merger investments (average of the four years after the merger ratio of the capital expenditures over the assets) than firms that make cash mergers in the four years after the merger (I obtain similar results for the four years before the merger).

In the logistic regression I have run, with dummy 1 if the method of payment is cash and 0 if it is stock, results show that the level of post merger investments does affect the choice of method of payment. The four years post merger average capital expenditures (i.e. investments) show a negative and significant sign.

The theory of investment opportunities as motives of method of payment in mergers has its foundation, among the others, on Myers' (1977) theory of debt overhang.

In Myers (1977) firms that are overloaded with risky debt will have to leave some of the benefit from future investments to existing creditors. Hence, those firms' managers, in order not to damage shareholders, will be less willing to make future additional investments. As a consequence, firms that have access to many investment opportunities will tend to make less use of debt and, in the case of merger, to choose stock as a method of payment.

Previous studies have already tested the investment opportunities theory to explain the choice of the method of payment in mergers, using as proxy for the investment opportunities the Tobin's Q (see for example, Martin 1996). However, these studies have been criticized since Tobin's Q is also a measure of the market misvaluation of the firm.

Indeed, among the other theories on the method of payment in mergers there is the market misvaluation itself. Managers of acquirers that are overvalued (or more overvalued than the target firm) would prefer to make stock mergers instead of cash ones. As stated, Tobin's Q is one of the main proxies for the market misvaluation.

Therefore, the present study is innovative not only because it tests the investment opportunities theory with a proxy that should be able to truly capture the investment opportunities, but also because with this "new" proxy the study is able to distinguish the effects of the two theories (investment opportunities and market misvaluation) on the choice of method of payment. The two theories are in fact not mutually exclusive and both contribute to explain the choice of method of payment.

The Tobin's Q, introduced as independent variable in the logistic regression, should represent only the market misvaluation: the capital expenditures (the investment opportunities proxy) should be able to capture the Tobin's Q part that represents the investment opportunities (the rational

expectation of the market) and to leave the sole meaning of market misvaluation (the irrational valuation of the market) to the variable.

The debate among the drivers of the choice of payment in mergers and the meaning of Tobin's Q is still open (see Dong et al. 2006). It involves the rationality of the market. Tobin's Q, used as a proxy for investment opportunities, postulates that the market is rational and able to recognize the real growth opportunities of the firm, while Tobin's Q, used as market misvaluation, postulates that rational managers exploit an irrational market.

Hence, there is the need of a new proxy for investment opportunities that is able to disentangle the two effects, which might coexist. My study makes an attempt to reach this goal.

A final remark. Several studies analyze the post mergers performance of companies and some works' results show that firms that have made stock mergers perform worse than firms that have made cash mergers.

Specifically, Loughran and Vijh (1997) analyze the long run (five years after the merger) performance of firms that have made a merge. Their findings show that stock acquirers perform poorly if compared to cash acquirers and matching firms (similar for size and book to market ratio) that do not merge. These findings support the market misvaluation hypothesis.

On the other side, the evidences of the post merger different level of capital expenditure between cash and stock merged entities appear to imply that managers might truly believe in the investment opportunities of their firm.

Therefore, my findings seem to suggest that both the market and the manager are overconfident about the growth opportunities of the firm and it might be that the commonly perceived growth opportunities lead the market misvaluation. The results might give a possible link to the misvaluation and growth opportunities theories in the merger context.

APPENDIX - OPEN QUESTIONS

The purpose of this appendix is to give a snapshot of the merger activities during the last thirty years and to illustrate some aspects of the mergers still not fully understood.

Numbers about mergers are impressive, as well as studies about them. Yet lots of open questions remain unanswered.

A Mergers and Huge Waves

The number of mergers made in the last thirty years has been amazing.

Andrade et al. (2001) report 4,256 mergers of public U.S. acquirers and targets between 1973 and 1998. Amazingly, in only nine years (1990-1998) 2,040 mergers have been made.

Dong et al. (2006) provide more recent data: in 1999 and 2000 about 600 mergers have taken place. The authors report 2,922 mergers from 1978 to 2000.

The numbers shown are incredibly high, especially if we remember that those are mergers made only by *public* firms in the *U.S.*

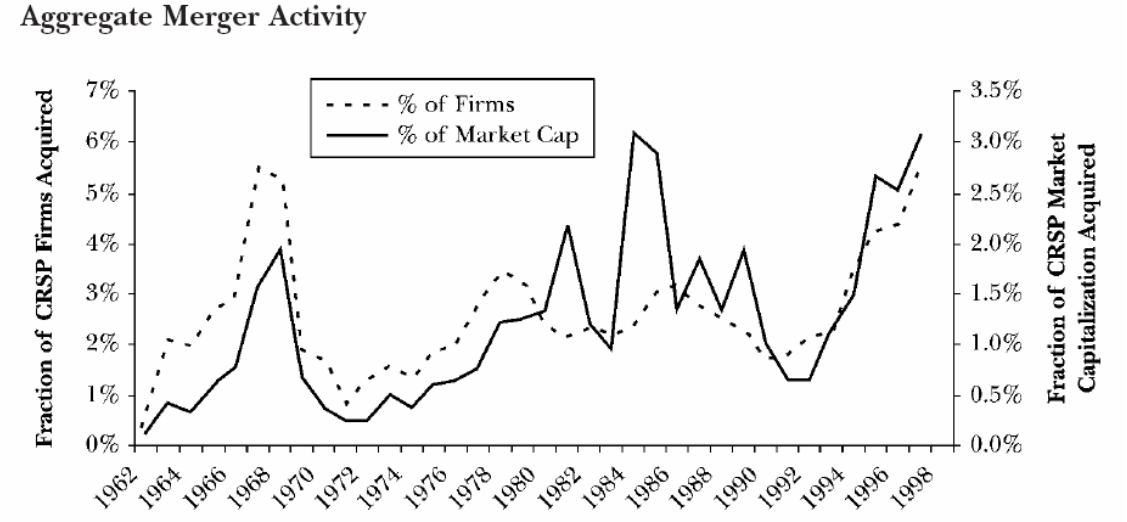
What can be underlined is that mergers usually come in waves: the 1960s, 1980s and 1990s ones are the most crucial. These waves have different characteristics and studies have reported different motives behind them.

“Neoclassical theory sees mergers as an efficiency-improving response to various industry shocks, such as antitrust policies or deregulation []. In the conglomerate mergers of the 1960s well-managed bidders built up diversified groups by adding capital and know how to the targets []. In the burst out takeovers of the 1980s, raiders financed by bank debt and junk bonds acquired and split up the very same conglomerates assembled in the 1960s, because the

conglomerate organization was no longer efficient []. The wave of related acquisitions in the 1990s, which still does not have a name, was part consolidation of major industries, and part response to deregulation" (Shleifer and Vishny, 2003, p.296).

The number of merged firms differs in the various waves as well as the value per transaction (see Data section).

Below I report an interesting graph about the percentage of firms and their total market cap as percentage of the public firms on CRSP (from Andrade et al., 2001).



Note: "the dotted line represents the number of firms acquired during the year expressed as a fraction of the beginning-of-year number of firms in CRSP. The solid line gives a meaning to the values involved, obtained by dividing the aggregate dollar value of mergers over the year by the total beginning-of-year market capitalization of the firms listed on CRSP" (Andrade et al. 2001, pp.104-105).

The percentage of firms that made a merger over the total companies on CRSP appears similar in the 1960s and in the 1990s, although the percentage of market cap is significantly lower in the first period. The 1980s are characterized by a higher percentage of market cap. and a lower percentage of number of firms.

However, these are relative numbers, calculated as percentage of the total firms on CRSP. In absolute value it appears that the 1990s, compared to the 1980s, are characterized by a higher number of deals and a higher value per transaction (in 2001 dollars, see Dong et al., 2006).

Interestingly different industries create different merger waves. The top five industries in a merger wave are not the same of the succeeding period. Hence, industries do play an important role in mergers waves.

I report a study made by Andrade et al. (2001) on the top five industries that characterized the three mentioned mergers waves (what I called 1960s mergers are reported as 1970s).

Top Five Industries Based on Average Annual Merger Activity

1970s	*1980s*	*1990s*
Metal Mining	Oil & Gas	Metal Mining
Real Estate	Textile	Media & Telecom.
Oil & Gas	Misc. Manufacturing	Banking
Apparel	Non-Depository Credit	Real Estate
Machinery	Food	Hotels

Source: Andrade et al (2001).

We could state that mergers have characterized three decades. In order to understand this phenomenon, studies have focused on motives (rational and irrational), characteristics and performance of mergers. Yet many aspects remain unclear and this is why academicians still study mergers and the other side of the coin, demergers or spin off.

B Mergers: Still Too Many Doubts

Why mergers happen? The debate is still open.

Among the main theories, there is the effort to create economies of scale or synergies, to increase market power of the company, to substitute inept target managers, to diversify the acquirer portfolio, to increase the manager's "empire".

Those are what we can define possible rational motives behind the event of a mergers. However, in the last years some studies have proposed irrational causes: the manager might be very optimistic about his skills to run firms and to be able to create more value from the target than his predecessor.

Hence, again, what are the reasons behind mergers? Different waves have probably different motives behind them. But yet, can we distinguish what is the main cause of the 1990s waves? Are managers opportunistic agent or just overconfident?

The different theories have important implications behind: the rationality of managers, which has been put in doubt only in recent years.

Do mergers create value for acquirers and target shareholders?

Again, this is an open question. It is accepted by the literature that target shareholders gain more from mergers than acquirers ones in terms of stock returns. Studies show positive abnormal returns for the target shareholders and mixed evidences for the acquirers' ones. There are also mixed results for the acquirer and target together. Yet, there are still many doubts.

Usually in order to measure abnormal returns, the two frequently used event windows are: from one day before to one day after the announcement and a broader window that starts several days before the announcement and finishes at the close of the merger.

However, the market might not react so quickly to the merger and adjust price accordingly. Hence a larger time period should be taken into consideration.

Studies have analyzed a longer time period, sometimes five years (Loughran and Vijh, 1997). In this case the major downside is the method to calculate abnormal long run returns. The differences between diverse methods are huge and lead to opposite conclusions.

Moreover the abnormal returns are different for the method of payment used. Stock mergers seem to be less profitable than cash ones.

Hence, do acquirer and/or target shareholders benefit from mergers? There are still some doubts.

Are mergers profitable? Again the question is still open.

We might expect an increase in cash flow, due for example to economies of scale or synergies. Ravenscraft and Scherer (1989) find that the target line of business shows lower profits after merger.

On the other side Healy et al. (1992) demonstrate that the operating cash flows of merged company decrease from the pre-merger period on average, but that the cash flows of non-merged companies in the same industry decrease even more. Therefore, post mergers operating performance increase if compared to the performance of firms in the same industry.

Those mentioned are only some of the doubts around mergers.

The debate is not only about the methodology used to calculate a long run return or the right measure of profitability.

Behind some of the doubts there is the question about the rationality of the market and/or the managers, which could lead to new results or different interpretations of the previous findings.

The motives behind the method of payment are a clear example of different interpretations of the same results. High Tobin's Q of the acquirer leads to a stock merger. Is it because the market rationally incorporates the future growth opportunities of the firm (investment opportunity hypothesis) or is it

because the market is irrational and overvalues the acquirer allowing rational managers to exploit this misvaluation, timing the market?

Is there a third hypothesis? My study makes an attempt to disentangle the problem or at least to provide a different approach to the issue.

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