FIE401 - First assignment
Methods of Payment in M&A transactions

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Overview

Research question: Do certain mergers destroy value for bidder shareholders?

At the firm level, corporate takeovers are among the largest investments that a firm can undertake. At the economy level, M&A deals are among the most important drivers of capital reallocation across firms. They happen quite often: Worldwide, there were 49 058 M&A transactions in 2022. The aggregate value of these deals was $3.15 trillion (approx. 3% of the World GDP).

Data on M&A deals provides researchers with a unique opportunity to analyze value implications of managers' investment decisions. In this assignment, you will evaluate the effect of takeovers on the wealth of bidder shareholders. In particular, you will study whether the method of payment - stock versus cash - is important. In addition, you will examine whether the effect is different for public and private targets.

Value of M&A transactions to bidder (and target) shareholders is usually measured by (aggregated across several days, abnormal relative to some asset pricing model) stock market reaction to the M&A announcements. This metric is intuitive: If an M&A deal creates value, then the announcement of the deal is good news for shareholders, so stock price will go up. The change of market capitalization of the firm after the M&A announcement will thus reflect the added value from the deal.

Researchers have been investigating merger announcements and the method of payment for decades. See this passage from Officer, Poulsen, and Stegemoller (2009):

> Particularly compelling is the result that announcement returns are significantly negative on average when acquirers use stock to acquire publicly traded targets (Travlos, 1987), whereas the opposite is true for takeovers of privately held targets (Chang, 1998). A widely accepted rationale for the negative returns associated with stock payments for public targets is adverse selection: managers use stock as currency to pay for acquisitions only when that stock is overvalued.[2] A further puzzle, therefore, is why the method of payment is associated with such different valuation effects in acquisitions of public versus private firms.

For a list of papers investigating the choice of payment in a merger setting, see Betton et al., 2008, Table 4.

Formalities

Work together in assigned groups (check "People" section in the course navigation panel on Canvas, then "Groups" tab; search for your name; find the "G* Assignment 1" group where * is a number). **Deadline for assignment's submission is October 5 at 14:00.** Submit your assignment even if you do not finish all tasks. To get a pass, 50% has to be correct.

Please submit two files:

- your **commented** coding file (file extension: ".R")

- a report with the numerical results and answers to assignment's questions (file extension: ".pdf")

Solution to the assignment will be released on October 5 at 17:00.

Submissions on October 5 after 14:00 but before 17:00 will get a warning. Two warnings or one submission after 17:00 - no access to the exam.

Please comment your code neatly so that a reader can reconstruct your thinking. You need neither to explain the used functions nor to describe your code in the report. Please keep your answers brief.

On Canvas, you will find a guideline of how to make good tables. Note that we will cover the subject of how to present research in detail in the last lecture of this course.

After submission, the assignments will be randomly redistributed. Read your peers' work carefully and compare your solution to theirs. There are many different approaches to code the same exercise, so let's learn from each other.

To make it easy for us to allocate individual assignment submissions, please follow the suggested file name structure:

- For the code: "Assignment1_X.R"
- For the report: "Assignment1_X.pdf"

where "X" indicates the group that submitted the assignment (e.g., "G4" or "G32").

Please do not include any personal information in the submitted files.

Note that some concepts are introduced for the first time. Please use online resources to clarify unfamiliar concepts.

If you are unsure how to use a certain command, either use R's own documentation (type `?command_name()`) or use *www.stackoverflow.com*.

Data provided for this assignment

The file CAR_M&A.Rdata contains 5 154 deals over the 1990-2014 period. The sample consists only of deals that fulfill a set of criteria that are typically used in the M&A literature:

- Domestic transactions (U.S. acquirers and U.S. targets)
- Completed control transactions (acquirer holds less than 50% of the target shares before the announcement and ends up with 100% of the target shares)
- Public acquirers and targets of all statuses (private, public, subsidiaries)
- Deal value of at least $1 million
- Relative transaction size (ratio of the deal value to the acquirer market value) of at least 1%
- Financial industries (SIC codes 6000-6999) excluded
- Necessary information available in the CRSP and COMPUSTAT databases to compute the acquirer cumulative abnormal return (CAR) and the set of control variables.

The dataset includes a set of variables widely used in M&A literature (e.g., Moeller et al. (2004); Golubov et al. (2015)):

- *yyyymmdd*: year, month, and day of the deal announcement;
- *yyyy*: year of the deal announcement;
- *bidder.car*: The acquirer's cumulative abnormal return (CAR) calculated over a three-day event window centered on the deal announcement. Abnormal returns are calculated using the market model. Estimation window is from day -300 to day -91 relative to the announcement on day 0;
- *deal.value*: the deal value in millions of U.S. dollars;
- *bidder.size*: the bidder's market value at the end of the fiscal year before the acquisition announcement in millions of U.S. dollars;
- *deal.allstock*: a dummy variable equal to 1 if the transaction is fully paid in stock;

- *private*: a dummy variable equal to 1 if the target is a private company;
- *public*: a dummy variable equal to 1 if the target is a public company;
- *bidder.mtb*: the acquirer market value of assets (defined as the book value of total assets minus common equity plus the market value of equity) divided by the acquirer book value of assets;
- *bidder.runup*: the market-adjusted buy and hold return of the acquirer's stock price from day -210 to day -11 with respect to the announcement date;
- *bidder.fcf* (free cash-flow): the acquirer's operating income before depreciation minus interest expense and income taxes plus changes in deferred taxes and investment tax credit minus dividends on both preferred and common share divided by the book value of total assets;
- *bidder.lev* (leverage): the acquirer's long-term debt divided by the market value of assets, defined as above;
- *bidder.sigma*: the standard deviation of the acquirer market-adjusted daily returns from day -210 to day -11 with respect to the announcement date;
- *deal.relsize*: the ratio of the deal value to the acquirer market value;
- *horz* (horizontal): a dummy variable equal to 1 if the bidder and the target operate in the same industry at the two-digit SIC code level;
- *deal.tenderoffer*: a dummy variable equal to 1 if the deal is classified as a tender offer in the SDC database; and
- *hostile*: a dummy equal to 1 if the transaction is classified as hostile in the SDC database.

Tasks

- Familiarize yourself with the data
  - Are there outliers? Winsorize the data if necessary.
- Descriptive table 1
  - For each year in the sample, report the number of deals, the average deal size, the share of deals with private targets, and the share of deals fully paid in stock [you may find `aggregate()` function with options `FUN=length` and `FUN=mean` useful; also, consider `kable()` function from package `knitr` to generate a nice table].
- Descriptive table 2
  - Report the number of observations, mean, standard deviation, and percentiles (10, 25, 50, 75, 90) for each variable you include in your regressions [you may use function `sumtable()` from package `vtable`].
- Regression table 1
  - Make a regression table with 3 models:
    - Regress *bidder.car* on *deal.allstock* using a sub-sample of public targets.
    - Regress *bidder.car* on *deal.allstock* using a sub-sample of private targets.
    - Regress *bidder.car* on *deal.allstock*, *public*, and their interaction using the whole sample.
- Regression table 2
  - Make a regression table with 4 models:
    - Regress *bidder.car* on *deal.allstock* and controls using a sub-sample of public targets.
    - Regress *bidder.car* on *deal.allstock* and controls using a sub-sample of private targets.
    - Regress *bidder.car* on *deal.allstock*, *public*, their interaction, and controls using the whole sample.
    - Regress *bidder.car* on *deal.allstock*, *public*, their interaction, controls, and interaction of each control with *public* using the whole sample.
- Comments and additional questions
  - Make sure that your report starts with a concise abstract presenting your analysis (as you would in your Master thesis).
  - Correct for heteroscedasticity of errors, report t-statistics rather than standard errors, prepare a stargazer table [use `stargazer()` function from package `stargazer`].
  - In the report:
    - Discuss your insights from Descriptive table 1.

    - Motivate selection of controls for the second regression table. Recall that if you have a simple regression model:
$$y = a + bx + \underbrace{cz + \epsilon}_{u}$$
where u is the composite error term, then omitting z is fine if $\mathbb{E}[z|x] = 0$ (z is not correlated with x) or $c = 0$ (z does not explain y). Stick to the same set of controls for all four regressions in Regression table 2.
    - Briefly discuss your regression results. Discuss statistical as well as economic significance of the method of payment.
- Answer the following questions:
    - Can you include both *private* and *public* as controls in the last regression of Regression table 1? If not, why?
    - What can you conclude about the effect of *hostile* if you add it as a control in the second regression of Regression table 1?
    - Note that the coefficient of the interaction term in the last regression of Regression table 1 is exactly the difference between the *deal.allstock* coefficients in the first and the second regressions. Building on this observation, which regression is correct, the third or the last regression in Regression table 2? Formulate the rule that you should follow when you deal with interactions.
    - Can you conclude that you uncovered the unbiased effect of the payment method on the value for bidder shareholders in Regression table 2?

References

- Betton, S., Eckbo, E., Thorburn, K., 2008, Corporate takeovers. In Handbook of Corporate Finance: Empirical Corporate Finance, Vol. 2, E. Eckbo, ed. Amsterdam: Elsevier/North- Holland
- Golubov, A., Yawson, A., Zhang, H., 2015, Extraordinary acquirers. Journal of Financial Economics, 116(2), pp. 314-330.
- Moeller, S., Schlingemann, Fr., Stulz, R., 2004, Firm size and the gains from acquisitions. Journal of Financial Economics, 73(2), pp. 201-228
- Officer, M., Poulsen, A., and Stegemoller, M., 2009, Target-firm information asymmetry and acquirer returns. Review of Finance, 13, pp. 467–493