

FIN 325 Corporate Finance

L15 (Applications): Mergers and Acquisitions

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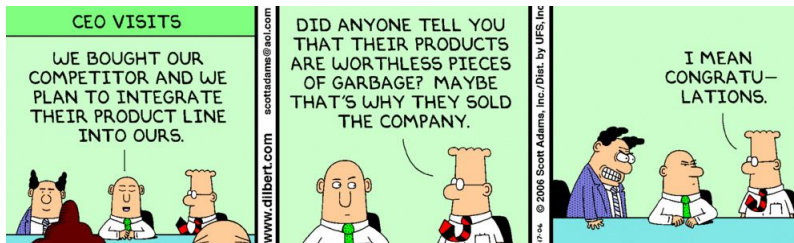
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Definitions

- **Merger**: transaction in which assets of two or more firms are combined into a new firm.
- **Acquisition**: purchase of one firm (target) by another firm (acquirer).
 - **“Friendly”**: offer made directly to management.
 - **“Hostile”**: tender offer made to shareholders.
- **Tender offer**: agreement to buy a certain amount of shares at a specified price.
- I'll just refer to mergers and acquisitions **interchangeably** throughout the lecture.

Types of mergers

- **Vertical:** combination of firms at different stages of production.
- **Horizontal:** combination of firms in the same line of business.
- **Conglomerate merger:** firms in unrelated markets combine.
- When might each type of merger be a good idea?



Reasons to merge

- Corporate synergies: efficiency gains from pooling resources.
- Market power: reduce the competition; can lead to higher markups.
- Taxes: assume more debt; higher tax shields.
- Replace inefficient managers: company is “undervalued”; make more efficient use of resources.
- Empire building: could be wasteful or inefficient spending.

Modes of payment (1)

- The idea that the acquirer wants to buy all the **shares** of the target company.
 - Debts of target assumed by the acquirer.
- Two potential payment methods — cash or stock.
- **Cash deal**: pay for the outstanding shares with cash.
 - Generally preferred by target shareholders.
 - More likely deal will go through.
 - Will trigger capital gains tax for shareholders immediately.
- **Share deal**: buy shares with the acquirer's stock.
 - No immediate taxable gains.
 - Exposes the target shareholders to higher risk (and potential return).
- **Hybrid deals** also exist — combinations of both.
- **Premium**: will generally need to pay a price above prevailing market price in cash deal.

Modes of payment (2)

- When might the acquirer prefer to use a stock deal?
- When might the acquirer prefer a cash deal?
- Information asymmetry and signalling!



Biggest mergers of all time

Acquirer Name	Target Name	Announced	Announced Value	Payment type
Time Warner Inc	Historic TW Inc.	1/10/00	\$186.2 billion	Stock
Vodafone Group PLC	Vodafone Holding GmbH	11/14/99	\$185.0 billion	Stock & debt
Verizon Communications	Cellco Partnership	9/2/13	\$130.1 billion	Cash & stock
Shareholders	Philip Morris International	8/29/07	\$107.6 billion	
Multiple acquirers	RBS Holdings NV	4/25/07	\$100.0 billion	Cash & stock
Pfizer Inc.	Warner-Lambert Co.	11/4/99	\$87.3 billion	Stock
AT&T Inc.	BellSouth Corp.	3/5/06	\$83.1 billion	Stock
Exxon Mobil Corp.	Mobil Corp.	12/1/98	\$80.3 billion	Stock
Royal Dutch Shell PLC	Shell Transport & Trading Co.	10/28/04	\$80.1 billion	Stock
Comcast Corp.	Comcast Cable Communications	7/9/01	\$76.0 billion	Stock
Sanofi	Aventis SA	1/26/04	\$73.4 billion	Cash & stock
GlaxoSmithKline PLC	SmithKline Beecham Ltd.	1/17/00	\$72.4 billion	Stock
Verizon Communications	GTE Corp.	7/28/98	\$71.1 billion	Stock
Citigroup Inc	Citicorp/Old	4/6/98	\$69.8 billion	Stock
AT&T Inc.	AT&T Teleholdings Inc.	5/11/98	\$68.2 billion	Stock
Comcast Corp.	Time Warner Cable Inc.	2/13/14	\$67.6 billion	Stock

Figure 1: Source: Business Insider (2014)

Valuation overview (1)

- Once we have a target, we need to put a **valuation** on the merger.
- Several potential methods for valuing a firm you're about to acquire.
- Best method to use is always **DCF** analysis.
 - Treat the acquisition as a project just like any other.
 - Gives you a direct valuation of the project.
 - Can be hard to estimate cash flows.
- Another popular method uses **multiples**.
 - Widely used in industry.
 - Quick and easy.
- I'll talk about both methods here, but **DCF** is the best bet usually.

Valuation overview (2)

- Consider Firm A, who is considering acquiring Firm B.
 - Value of Firm A is V_A and Firm B is V_B .
 - Assume that both firms are 100% equity.
 - Value of combined Firm is V_{AB} .
 - S is synergy gains.
 - E are expenses associated with the transaction.
- Let's consider first a cash deal where Firm A pays Firm B cash in the value of P .
- Value of the combined firm in a **cash deal** is

$$V_{AB} = V_A + V_B + S - P - E$$

Valuation overview (3)

- NPV in **cash deal** for Firm A (acquirer)

$$\begin{aligned}NPV_A &= V_{AB} - V_A \\ &= S - (P - V_B) - E\end{aligned}$$

- NPV in **cash deal** for Firm B (target)

$$NPV_B = P - V_B$$

- Both Firm A and Firm B NPVs are the incremental gains for the firm shareholders in question.

Valuation overview (4)

- In **stock deal**, the cash for the acquisition no longer leaves the firm.

$$V_{AB} = V_A + V_B + S - E$$

- The share of ownership given to the Firm B shareholders is given by $0 < \alpha < 1$ such that

$$\alpha V_{AB} \geq V_B$$

which says their share in the combined firm must be at least as valuable as if the deal didn't take place.

- NPV in a **stock deal** for Firm A is given by

$$\begin{aligned} NPV_A &= (1 - \alpha)V_{AB} - V_A \\ &= (1 - \alpha)[V_A + V_B + S - E] - V_A \\ &= (1 - \alpha)[V_B + S - E] - \alpha V_A \end{aligned}$$

- NPV in a **stock deal** for Firm B is given by

$$\begin{aligned} NPV_B &= \alpha V_{AB} - V_B \\ &= \alpha[V_A + S - E] - (1 - \alpha)V_B \end{aligned}$$

Valuation overview (5)

- We know the value of our own firm — V_A .
- We should have a very good idea as to what the expenses of facilitating the transaction would be — E .
- We now need to figure out the values of S and V_B .
- We can use DCF or multiples approaches to find V_B .
- Use DCF to estimate S .

Example I (1)

- Firm A is considering a takeover of Firm B. Both firms are 100% equity.
- Firm A currently has market value of \$100m and that for Firm B is \$20m.
- There are no expenses associated with the takeover.
- Synergy gains are estimated to come through cost savings from combining the firms. These synergies are estimated to be to the value of \$5m per year for the first 2 years (starting in the year after the deal) and then to grow at 1% per year thereafter in perpetuity.
- Assume a discount rate of 5%.

Example I (2)

- (a) What is the smallest amount that the shareholders of Firm B would accept in a cash deal?
- (b) What is the smallest fraction of the combined firm that the shareholders of Firm B would accept in a share deal?
- (c) What is the maximum amount Firm A is prepared to pay in a cash deal?
- (d) What is the largest fraction of the combined firm that the shareholders of Firm A would offer in a share deal?
- (e) What can we say about the cash price and fraction that would prevail under the two types of deals?

Example I solutions (1)

- (a) Under a cash deal, the NPV to the shareholders of Firm B is given by

$$\begin{aligned}NPV_B &= P - V_B \\ &= P - \$20m\end{aligned}$$

where P is the amount of cash offered. The minimum offer they'd take is \$20m.

- (b) Firstly we need to value the synergies. We do this using the formula

$$\begin{aligned}S &= \frac{5}{1.05} + \frac{5}{1.05^2} + \frac{5(1.01)}{1.05^3} + \frac{5(1.01)^2}{1.05^4} + \dots \\ &= \frac{5}{1.05} + \frac{1}{1.05} \left[\frac{5}{1.05} + \frac{5(1.01)}{1.05^2} + \dots \right] \\ &= \frac{5}{1.05} + \frac{1}{1.05} \frac{5}{0.05 - 0.01} \\ &= \$123.81m.\end{aligned}$$

Example I solutions (2)

- The NPV to Firm B shareholders under the share deal is

$$\begin{aligned}\widehat{NPV}_B &= \alpha[\$100m + \$123.81m] - (1 - \alpha)\$20m \\ &= (\$243.81m)\alpha - \$20m.\end{aligned}$$

where α is the share they retain. We need to then set α such that the project has a zero NPV

$$\begin{aligned}243.81\alpha - 20 &= 0 \\ \Rightarrow 243.81\alpha &= 20 \\ \Rightarrow \alpha &= 0.082\end{aligned}$$

Example I solutions (3)

- (c) The NPV of the cash deal for Firm A shareholders is given by

$$\begin{aligned}NPV_A &= \$123.81m - (P - \$20m) \\ &= \$143.81m - P\end{aligned}$$

meaning that \$143.81m is the maximum cash price the Firm A shareholders would be willing to pay.

- (d) The NPV of the share deal for Firm A is

$$\begin{aligned}\widehat{NPV}_A &= (1 - \alpha)(\$20m + \$123.81m) - \alpha(\$100m) \\ &= \$143.81m - (\$243.81m)\alpha.\end{aligned}$$

So we can then set this NPV equal to zero and re-arrange for α to get $\alpha = 0.59$.

Example I solutions (4)

- (e) From the previous 4 parts of the problem, we get two ranges — one for the P value and one for α .

$$\$20m \leq P \leq \$143.81m$$

$$0.082 \leq \alpha \leq 0.590.$$

This is the extent of the information we have though. Where the price/fraction would land in the actual negotiation would depend on the **bargaining power** of the respective two parties.

Valuing target company: DCF approach

- This method will generally work for public companies
 - Need financials to be readily available.
- Determine forecast period.
 - Usually give accurate forecasts for short/medium period and then use perpetual/terminal value for the future cash flows.
- Just like a stream of cash flows from a project, we'll discount them and sum them up.

Valuing target company: multiples approach (1)

- This method is good for when cash flow estimates are hard to find.
 - E.g. when the company is private.
- Basic idea: similar companies should have similar valuations.
- Procedure:
 - (1) Find comparable companies to the target.
 - (2) Choose an appropriate multiple to use, (e.g. price/sales).
 - (3) Find multiples that correspond to the comparables.
 - (4) Average multiples found in step (3).
 - (5) Apply target's data to average from step (4), (e.g. sales).
- This method will generally give you a wide variance in valuations when you use different multiples.

Valuing target company: multiples approach (2)

- Potential multiples you could use:
 - Price/earnings.
 - Price/sales.
 - Price/book.
 - Enterprise value/EBITDA.
 - Enterprise value/Sales.
 - Price/cash flow.
- Important to choose the right multiple for the firm you're trying to value.
 - What data do you have about their financial performance going forward?
 - Will a particular multiple produce a reasonable estimate, (e.g. target currently has negative EBITDA — EV/EBITDA will give a negative value!)?
- Often a good idea to try several multiples and compare the results.

Valuing synergies (1)

- These are not so easy to estimate.
- Need to think about what the gains might be from something like economies of scale or **cost savings**.
- E.g. in a vertical acquisition this should be relatively easy — just look at how much you'll be saving on paying suppliers in the future.
- Formal definition

$$\text{Synergies} = \sum_{t=1}^T \frac{\Delta FCF_t}{(1 + r_{\text{synergies}})^t}$$

where the change in FCF (ΔFCF_t) is relative to the **sum of the two firms**.

- I.e. $\Delta FCF_t = FCF_t(AB) - FCF_t(A) - FCF_t(B)$.
- Need to examine the effect on each component of FCF separately.

Valuing synergies (2)

- What discount rate should we use on the synergies?
- Needs to reflect systematic risk associated with the change in free cash flows.
- One suggestion:

$$r_{synergies} = \frac{V_A}{V_A + V_B} r_A(\text{Firm A}) + \frac{V_B}{V_A + V_B} r_A(\text{Firm B})$$

Example II

- Company A is considering an acquisition of Company B. Both firms are 100% equity.
- Company B is a private firm in the automotive manufacturing industry, with an expected sales of \$2m and EBITDA of -\$1m. No other information is available about Company B's financials.
- Companies C and D are also in the automotive industry.
- Company C has equity valued at \$50m, debt worth \$100m, sales of \$20m and EBITDA of \$10m.
- Company D has equity valued at \$60m, debt worth \$20m, sales of \$10m and EBITDA of \$5m.
- Company A has enterprise value of \$500m.
- Assume no expenses associated with administrating the transaction.
- If the expected synergy gains have a present value of \$20m, what is the **maximum price** that Company A would pay for Company B **in cash**?

Example II solution (1)

- We will use Company B and Company C as comparables for the valuation.
- Two multiples we could use are EV/sales and EV/EBITDA.
- For **Company C**:
 - $V_C = E + D = \$150m.$
 - $EV/sales = 150/20 = 7.5.$
 - $EV/EBITDA = 150/10 = 15.$
- For **Company D**:
 - $V_D = E + D = \$80m.$
 - $EV/sales = 80/10 = 8.$
 - $EV/EBITDA = 80/5 = 16.$

Example II solution (2)

- Next we average these ratios across Company C and Company D
- $\text{Average}(\text{EV}/\text{sales}) = 7.75.$
- $\text{Average}(\text{EV}/\text{EBITDA}) = 15.5.$
- Now let's estimate the EV for Company B.
- Using **EV/sales**: $V_B = \$2m \times 7.75 = \$15.5m.$
- Using **EV/EBITDA**: $V_B = (-\$1m) \times 15.5 = -\$15.5m???$
- Using EV/EBITDA is nonsense.
- \$15.5m is a reasonable estimate using EV/sales.

Example II solution (3)

- If we let P be the price paid for the transaction, the NPV can be found using

$$\begin{aligned}NPV_A &= S - P + V_B \\ &= \$20m - P + \$15.5m \\ &= \$35.5m - P\end{aligned}$$

- Means that the **maximum price** they'd be willing to pay is \$35.5m — would set the **NPV equal to zero**.
- If they get the firm for a price below that, then they'd be getting a **good deal**.

Market reactions to merger announcements

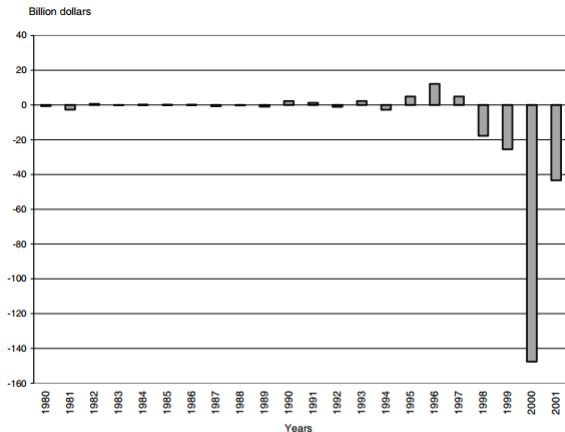


Figure 1. Yearly aggregate dollar return of acquiring-firm shareholders (1980 to 2001). Data are from the SDC Mergers and Acquisitions Database. The graph shows the aggregate dollar return associated with acquisition announcements for each sample year. The aggregate dollar return is defined as the sum of the product of the abnormal return of each announcement multiplied by the equity capitalization of the acquirer.

Figure 2: Moeller, Schlingemann, Stultz (2005)

Value destruction?

- Does the previous figure indicate that value is being destroyed by M&A for the acquirer?
- Not necessarily! Think about **counterfactuals**.
- What would have happened if the deal **didn't** go through?
- It's possible that **even more negative** reactions could have prevailed in the deal's absence.
- Why?

M&A and information asymmetry

- Remember back to the adverse selection problem!
- The announcement of the merger may be **revealing information** about the companies involved.
- Maybe the **acquirer** is deficient in some areas of its operations.
- The **target** may excel in these areas.
- Announcing the acquisition may **reveal these deficiencies**.
- Market updates beliefs about the companies.
 - Rise in **target's** stock price.
 - Decrease in **acquirer's** stock price.
- Jovanovic and Braguinsky (2004).

Example III

- Boeing spent \$1b on the development of a secret luxury jet.
- It's other operations have a value of \$10b.
- Global Co. has also been developing a similar jet. It has no costs and no other assets.
- Engineers know that with certainty that only one of the two production processes will be successful.
- If the development is successful, it's worth \$2b. If not, it's worth \$0.
- Assume that the market is unaware of which process was successful — they put 50% probability on each.
 - (1) When will Boeing acquire Global Co.?
 - (2) Assume that the acquisition takes place for \$2b and that there are no synergies. What happens to the stock price if these two firms merge?
 - (3) Was value destroyed for the acquirer?

Example III solutions (1)

- (1) The acquisition will only have value if Boeing was unsuccessful and Global was successful. Consequently, the transaction taking place will signal that Boeing was unsuccessful.
- (2) The market cap for Boeing is $E_{Boeing}^{Initial} = 10 + 0.5(2) + 0.5(0) = \$11b$ before acquisition.
 - If the acquisition **were** to take place $E_{Boeing}^{Merger} = 10 - 2 + 2 = \$10b$.
 - The market cap for Global is $E_{Global}^{Initial} = 0.5(2) + 0.5(0) = \$1b$.
 - If the acquisition **were** to take place $E_{Global}^{Merger} = \$2b$ (the cash payment).
 - Return for Boeing is $(10 - 11)/11 = -9.1\%$.
 - Return for Global is $(2 - 1)/1 = 100\%$.

Example III solutions (2)

- (3) No value was either created or destroyed. The value of Boeing was \$10b both with and without the merger (if Global was successful and Boeing was not). Moreover Global was worth \$2b either way in this scenario; the merger was just about information revelation.
- **Implication:** if information is actually revealed by these transactions, then we should see persistence in prices after reactions even if the deal doesn't take place.

Persistence (1)

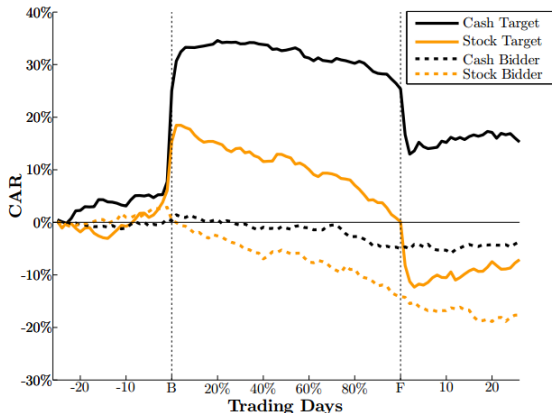


Fig. 1. Announcement Effects at Bid and at Failure (+/- 25 days). Cumulative abnormal returns (CARs) from 25 trading days before announcement of the initial bid (B) to 25 trading days after deal failure (F). The sample consists of 81 pure-cash and 102 pure-stock deals (see summary statistics in Panel B of Table 1).

Figure 3: Malmendier, Opp, Saidi (2012)

Persistence (2)

- Cash targets typically trade persistently above their pre-announcement level by 15%.
- Cash acquirers typically aren't re-valued.
- Suggests that maybe the medium of purchase **also in itself** reveals information about the target.

Takeaways

- M&A are interesting transactions, but should be valued in the same way as any other project.
- Information asymmetry is the key friction.
- Transaction announcements can have implications for the future trading value of the target and acquirer.