Faculty of Social Sciences

Corporate Finance Theory

Lecture 7

Financing Through Asset Sales (2)
Edmans and Mann (2019)

Nick Vikander
Department of Economics

Intended outcomes for the day:

1. **To intuitively describe** how the Camouflage effect influences the incentives for low-quality firms to sell assets.

2. **To analyze mathematically** how the Correlation effect influences the incentives high-quality firms to sell assets.

3. **To discuss** the importance of negative correlation an example with BP, and to **contrast** with an alternative explanation.

Recap - Model

Two players: Firm and Investor

Firm quality is high or low: type $q \in \{H, L\}$. "Firm H", "Firm L".

-Firm knows its own quality.

-Investor places probability $\pi \epsilon (0,1)$ on Firm quality being high

Firm has core assets of value C_q, divisible non-core assets of value A_q, where

$$C_H > C_L$$

$$C_H + A_H > C_L + A_L$$

Two more assumptions on value of non-core assets

$A_H > A_L$ (positive correlation)

Synergies: non-core assets with "true" value A_q, total firm value falls by $A_q(1+k)$, where much of Lecture 6 assumed k = 0

Must either sell non-core assets or sell equity to raise fixed amount F < A_L , for zero NPV investment. Which choice maximizes Shareholder = Firm value?

We mean: incumbent / existing shareholder payoff.

Recap – Balance sheet effect

In Lecture 6, we showed there was a critical investment size, F^*, such that:

-for small investment (F < F^*) , Firm H has more incentive to sell assets than Firm L. An equilibrium exists where **both firms sells assets** (if k = 0).

-for large investments (F > F^*) , Firm H has more incentive to sell equity than Firm L. An equilibrium exists where **both firms sell equity** (if k = 0).

-Equity that is issued includes claim on funds F, appearing on firm **balance sheet**. Reduces information asymmetry for equity, pushes H to sell equity. This logic also holds with non-zero synergies.

-The incentive constraint of Firm H is the one that matters, since it is the one facing a **lemons problem** (selling undervalued claim).

Semi-separating equilibria

With **non-zero synergies,** the APE (asset-pooling-equilibirium and EPE (equity-pooling-equilibrium) **may not exist.**

Intuition:

-Very strong synergies ($k \gg 0$) -> never sell assets

-Very strong dissynergies ($k \ll 0$) -> never sell equity

But an equilibrium will exist where Firm H sells asset if $k < k_H^*$ and Firm L sells assets if $k < k_L^*$.

critical value.

Firm H with k = k_H^* and Firm L with k = k_L^* must be indifferent.

Firm H has more incentive to sell equity than Firm L if and only if $F > F^*$, regardless of k.

-Implies $k_H^* < k_L^*$ if and only if $F > F^*$ (Proposition 2).

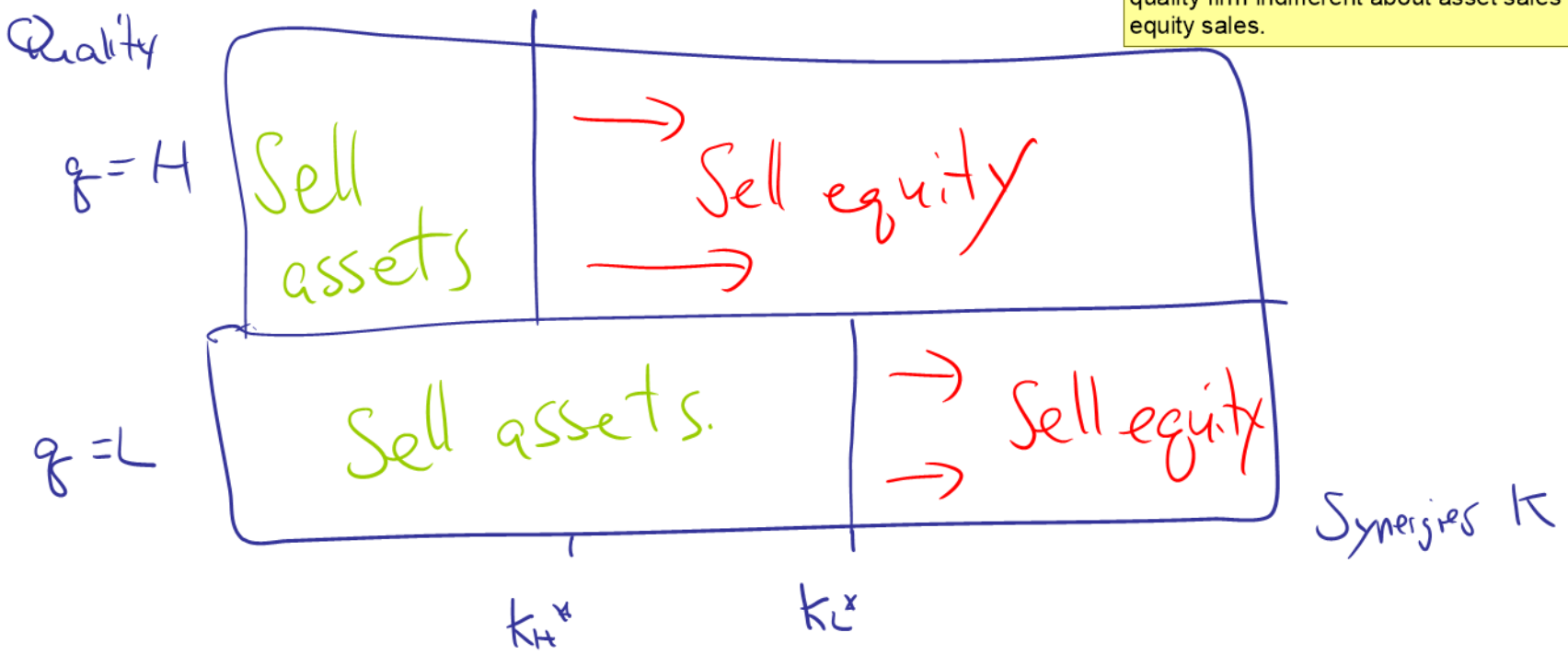
-For small investments, equity may be issued at a discount

-For large investments, equity issued at a premium.

compared to its ex ante expected value.

Suppose $F > F^*$. Thus, $k_H^* < k_L^*$

Formally, we could write down two indifference conditions, one defining k_H^* and the other defining k_L^*. Which leave a high, and low, quality firm indifferent about asset sales and equity sales.



Heuristic approach. Describe a semi-separating equilibrium where both high and low quality firms sells assets / equity, but for different levels of synergies.

Investors are savvy. They use Bayes' Rule. Understand that in equilibrium, with high investment size, high quality firms are more tempted to sell equity than low quality firms.

In the figure, that corresponds to k_L^* > k_H^*. Thus, they interpret equity sales as a postiive signal.

Similarly, they interpret asset sales as a negative signal.

We could draw a similar figure for small investment size. That is $F < F^*$

The only difference would be that, in this case, $k_H^* > k_L^*$.

Interpretation: that investors understand that selling equity is then a bad sign about firm quality.

Hence: equity should sell at a price lower than its ex ante expected value.

Camouflage effect

Now consider two changes to model:

Voluntary capital raising: Firm can raise financing F by selling assets or selling equity, but it can also do nothing.

Positive NPV investment: Firm that raises financing F generates cash $F(1+r_q) > \mathrm{F}$.

See Proposition 4. Includes the following:

(ii) If $1+r_H \leq \frac{E_H}{E_L}$, *a semi-separating equilibrium is sustainable in which H sells assets if* $k \leq k_H^*$ *and does nothing if* $k > k_H^*$, *and L sells assets if* $k \leq k_L^*$ *and issues equity if* $k > k_L^*$, *where* $k_L^* \geq 0$. *A rise in* r_H *increases both* k_H^* *and* k_L^*.

(iiia) If $\frac{E_H}{E_L} \geq 1+r_H > \frac{A_H}{A_L}(1+\underline{k})$, *then* $k_H^* > \underline{k}$ *and* $k_L^* > 0$. *The price of assets exceeds* A_L *and the price of equity is* $C_L + A_L + F(1+r_L)$. *If* $1+r_H > (<)\frac{A_H}{A_L}$, *then* $k_H^* > (<)\, k_L^*$ *and assets are sold at a premium (discount) to their expected value* $\mathbb{E}[A]$.

Camouflage effect

Condition:

$$\frac{E_H}{E_L} \geq 1 + r_H > \frac{A_H}{A_L}(1 + \underline{k})$$

$$E_q = C_q + A_q + F(1 + r_q)$$

↳ value of equity for firm of quality $q \in \{H, L\}$

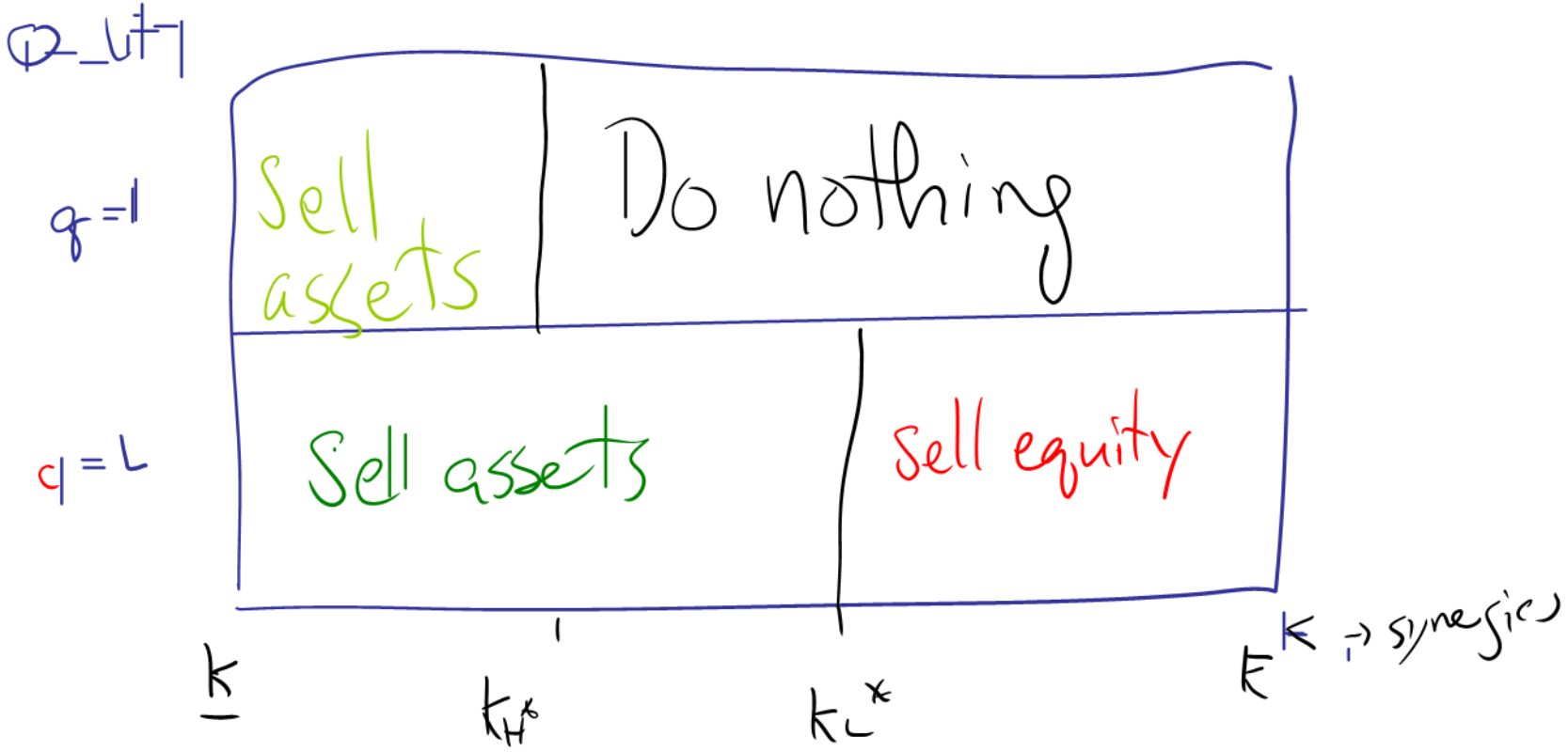
First inequality: Firm H would rather do nothing than sell equity, if issuing equity means Investor infers he is low quality.

Second inequality: Firm H with largest dissynergy would rather sell assets than do nothing.

An equilibrium exists where Firm H either sells assets or does nothing, and Firm L either sells assets or issues equity (depending on synergies)

-selling equity: fully reveals Firm L as having low quality

-Selling assets: Firm L can **camouflage**, by pooling with firms of high quality, $k_L^* > 0$



It could be that $k_H^* > k_L^*$; it might depend on parameter values etc.

Camouflage effect

An equilibrium exists where Firm H either sells assets or does nothing, and Firm L either sells assets or issues equity (depending on synergies)

-selling equity: fully reveals Firm L as having low quality

-Selling assets: Firm L can **camouflage**, by pooling with firms of high quality, $k_L^* > 0$

Intuition: low-quality firm may sell assets, despite positive synergies …

-because investors will believe the firm may be high-quality, and is only selling assets because of dissynergies.

Notice that similar ”camouflage” takes place in pooling equilibria!

-APE: assets sold at premium because of Firm H –> pushes Firm L to sell assets as well

-EPE: equity sold at premium because of Firm H –> pushes Firm L to sell equity as well

Correlation effect

Again assume investment has 0 NPV ($r_q = 0$), that the firm must either sell assets or sell equity, and set synergies equal to zero (k = 0).

Firm has core assets of value C_q, divisible non-core assets of value A_q, where

$$C_H > C_L$$
$$C_H + A_H > C_L + A_L$$

→ equity of Firm H is worth more than that of Firm L.

New assumption on value of non-core assets

$A_H < A_L$ (**negative correlation**)

" [Negative] correlation only means that high-quality firms are not universally high-quality, as they may have low-quality non-core assets."

Edmans and Mann also assume that Firm places positive weight on stock price (Investor belief of total Firm value); but not necessary for our purposes.

Equity-pooling equilibrium (EPE), negative correlation

Firm will sell equity if

$$Q^A A_q > Q^E(C_q + A_q + F)$$

Q^A: amount of (non-core) asset required to raise F

Let's proceed in the familar way from Lecture 6, where we solved for an equity pooling equilibrium.

Difference now: negative correlation.

Price is equal to value perceived by Investor.

Equity-pooling equilibrium: A_H (out-of-equilibrium beliefs)

Implies: $Q^A = F/A_H$

-If Investor sees asset sales, believes Firm has high quality

-Different from case of positive correlation, where Investor who saw this deviation believed Firm had low quality

-Nonetheless, similar idea: Investor believes that the "lowest value" asset is being sold

Activity: Equity-pooling equilibrium (EPE), negative correlation

Firm will sell equity if

$$Q^A A_q > Q^E(C_q + A_q + F)$$

Q^A: amount of (non-core) asset required to raise F

Equity-pooling equilibrium: A_H (out-of-equilibrium beliefs)

Implies: $Q^A = F/A_H$

Q^E: amount of equity that must be issued to raise F

Equity-pooling equilibrium: $\pi(C_H + A_H + F) + (1-\pi)(C_L + A_L + F)$ (Bayes' Rule).

Implies: $Q^E = F/(\pi(C_H + A_H) + (1-\pi)(C_L + A_L) + F)$

Question: Show that an EPE does not exist with negative correlation. That is, show Firm H can profitably deviate by selling assets.

Equity-pooling equilibrium (EPE)

That is, show that the inequality:

$$Q^A A_q > Q^E (C_q + A_q + F)$$

must always be violated, for at least one firm type q.

Substitute for Q^A , Q^E, q = H to obtain following inequality for Firm H (***):

$$1 \cdot \left(\frac{F}{A_H}\right) A_H > \left(\frac{F}{\pi(C_H + \ldots) + (1-\pi)(\ldots)}\right) \cdot (C_H + A_H + F)$$

which never holds. Hence, an EPE does not exist. In such a candidate equilibrium, Firm H would prefer to deviate by selling assets!

Intuition:

- -On the equilibrium path, Firm H suffers lemons problems in issuing equity. Value of equity issued exceeds F.
- -Off the equilibrium path, Firm H can sell assets for their true value. No lemons problem, value of assets sold equals F.

Equity-pooling equilibrium (EPE)

That is, show that the inequality:

$$Q^A A_q > Q^E(C_q + A_q + F)$$

must always be violated, for at least one firm type q.

Substitute for Q^A , Q^E, q = H to obtain following inequality for Firm H (***):

$$2.\ F > \frac{F(C_H + A_H + F)}{\pi(C_H + A_H) + (1-\pi)(C_L + A_L) + F}$$

equity value, high quality firm

weighted average, high and low quality.

which never holds. Hence, an EPE does not exist. In such a candidate equilibrium, Firm H would prefer to deviate by selling assets!

Intuition:

- -On the equilibrium path, Firm H suffers lemons problems in issuing equity. Value of equity issued exceeds F.
- -Off the equilibrium path, Firm H can sell assets for their true value. No lemons problem, value of assets sold equals F.

Separating equilibrium

Firm H sells assets, Firm L issues equity:

$$Q^A A_H < Q^E (C_H + A_H + F)$$

$$Q^A A_L > Q^E (C_L + A_L + F)$$

Substitute $Q^A = F/A_H$, $Q^E = \mathrm{F}/(C_L + A_L + F)$ (Bayes' rule):

$$F < \frac{F(C_H + A_H + F)}{C_L + A_L + F}$$

$$F\frac{A_L}{A_H} > \frac{F(C_L + A_L + F)}{C_L + A_L + F}$$

both of which hold, by $C_H + A_H > C_L + A_L$ and $A_H < A_L$. Equilibrium!

Summing up: correlation effect

Correlation effect pushes Firm H to sell assets. That is, with negative correlation:

-Firm H can sell assets without suffering from lemons problem

-Implication: an equity-pooling equilibrium does not exist

-Implication: a separating equilibrium exists where firms perfectly reveal their type, Firm H by selling assets, Firm L by selling equity.

-Separating equilibrium may still exist with non-zero synergies if Firm cares directly about stock price (i.e. Investor beliefs about total firm value).

-Intuitively, correlation effect is stronger when Firm cares about stock price, since Firm H can sell "low value" assets, and stock price will go up.

Application of correlation effect: BP

”For example, to cover the costs of Deepwater Horizon, BP is selling its mature fields and refocusing on high-risk exploration. The New York Times reported that analysts perceived this sale as a bet on a major new find that would displace the existing fields. The sale conveyed negative information about the mature fields but a positive signal about the growth prospects of the rest of the firm.” (p.6)

“For example, the value of BP's exploration activities

is likely to be negatively correlated with the mature fields that comprise the bulk of the firm, since the former may displace the latter.” (p.23)

These quotes are taken from an earlier working paper version of Edmans and Mann (May 2015). Suggest that negative correlation matters a great deal. But consider the following alternative explanation, inspired by Berk and DeMarzo textbook, p.534.

Application of correlation effect: BP

"Consider the plight of Robert Warren "Bob" Dudley, CEO of BP, who believes his company's stock is undervalued. BP's mature fields in the Gulf of Mexico are still profitable, but he seeks to convince investors of BP's even more promising future in high-risk exploration, to increase the current stock price.

One strategy to do so is to sell BP's mature fields. If Dudley is right, then BP will have no trouble making debt payments to existing creditors. But if Dudley is making false claims and the firm does not grow, BP will have insufficient revenues to pay creditors (i.e. suffer from financial distress). This distress will be costly for the firm and Dudley, who will likely lose his job."

Please focus on this part

Question: in groups , discuss what the main difference is between this explanation and Edmans and Mann. Which do you find more convincing, and why? Then go to socrative.com, room 897458**,** and write a short answer (3-4 sentences).

Application of correlation effect: BP

-Idea from Edmans and Mann may seem plausible. Alternative explanation perhaps not particularly realistic, but basic mechanism of interest. Inspired by ”signaling effect of debt” from Berk and DeMarzo.

This is a rather loose explanation.

-If management places strong bet on uncertain project, this can signal confidence to investors.

Differences: no need for negative correlation, but need extra idea that management will suffer from misleading investors about uncertain project. That is, the signal (selling mature fields) must be a credible signal of high project quality.

-In Edmans and Mann, selling assets is credible signal of high quality because of negative correlation (Firm L would suffer capital loss from selling)

Conclusion: Edmans and Mann (2019)

Balance sheet effect

-when financing needs are large, pushes high-quality firms to sell equity, by reducing lemons problem.

Camouflage effect

-if high-quality firms sell assets because of dissynergies, pushes low-quality firms to also sells assets and get a good price.

Correlation effect

-if high-quality firms have low-value non-core assets, pushes them to sell assets by eliminating lemons problem (and can also increase stock price).

Intended outcomes for the day:

1. **To intuitively describe** how the Camouflage effect influences the incentives for low-quality firms to sell assets. Investors that observe asset sales believe firm may be high quality, allows low-quality firm to camouflage.

2. To **analyze mathematically** how the Correlation effect influences the incentives for asset sales of high-quality firms. Negative correlation pushes high-quality firm to sell assets by eliminating lemons problem.

3. **To discuss** the importance of negative correlation in an example with BP, and to **contrast** with an alternative explanation. Importance is not negative correlation per se, but whether firm has some way of credibly signaling high quality.

For next time

1. Read Sections 1-3 of Malenko and Malenko (2015).

2. The paper's notation and general presentation are not always very clear, so focus on understanding the main ideas. For now, skip the mathematical details and formal proofs if necessary.

3. The most important thing for next lecture is to have a clear idea of their model setup, described in Section 2.

4. When reading, think about the following question: in this setting, are Private Equity Firms ("sponsors" who carry out leveraged buyouts) helped or hurt by their ability to exploit creditors? Be ready to share your thoughts next time.