



Faculty of Social Sciences



Corporate Finance Theory

Lecture 6

Financing Through Asset Sales (1) Edmans and Mann (2019)

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Intended outcomes for the day:

1. **To mathematically derive** how the Balance Sheet Effect in Edmans and Mann (2019) affects firm incentives to sell assets vs. equity.
2. To **analyze** the role that quality and synergies play in the Balance Sheet Effect.
3. **To intuitively describe** why the incentive constraint of high-quality firms, but not that of low-quality firms, matters for pooling equilibria.



Introduction

A firm faces an investment opportunity – how to raise funding?

Classic issue: equity vs debt

- Trade-off due to agency problems (moral hazard)
- E.g. debt overhang, asset substitution

Equity vs asset sales really means in their context a choice between selling a claim on the firm level, or on the "unit" level.

Edmans and Mann (2019): equity vs asset sales

- Trade-off due to information asymmetries (adverse selection)
- Cannot verify firm quality

Admati et al. (2018) also talked about equity vs asset sales but

- (i) Different context: reducing leverage
- (ii) Different mechanism: agency conflict with complete information



Introduction

Short video on three effects in Edmans and Mann (2019):

H, L
 $\text{Prior: } \pi \in (0, 1)$
 $C_H, A_H; C_L, A_L$
 $C_H > C_L; A_H > A_L$

Balance Sheet Effect

Camouflage Effect

Correlation Effect

and the notation in their model.

Raise funding F $\rightarrow$ what is the cheapest way to raise funds.
 NPV project.

In this lecture

- We focus on the Balance Sheet Effect
- We assume positive correlation: firms with higher quality core assets also have higher quality non-core assets

focus today

we'll get to it; next lecture

Activity

Consider a firm of either high or low quality, in the framework of Edmans and Mann (2019). The firm needs to raise an amount $F > 0$ either by selling assets or equity, to invest in a 0 NPV project.

Which of the following statements best reflects the **Balance sheet effect**?

- A) A larger value of F will increase the firm's incentive to sell assets, in particular if firm quality is high
- B) A larger value of F will increase the the firm's incentive to sell assets, in particular if firm quality is low
- C) A larger value of F will increase the firm's incentive to sell equity, in particular if firm quality is high
- D) A larger value of F will increase the firm's incentive to sell equity, in particular if firm quality is low

Please go to socrative.com, room 897458, and submit what you believe is the best answer.

most popular answer



Model – Selling Assets vs Equity

Firm insider's payoff
 Sell Q^A assets
 Q^E equity.

Payoff from selling assets:

$\xrightarrow{\text{core asset}} C_q + (1 - \underbrace{Q^A}_{\text{non-core assets}})A_q + F$

Subscript
 $g \in \{H, L\}$.
 ("quality")

Payoff from selling equity:

$(1 - \underbrace{Q^E}) (C_q + A_q + F)$

Firm will sell equity if

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



Value of assets sold must exceed value of equity sold

Payoffs

Firm will sell equity if

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

Rewrite:

$$\frac{A_q}{(C_q + A_q + F)} > \frac{Q^E}{Q^A}$$

The expression on the right-hand side is independent of the firm's true quality. It depends on the willingness to pay of investors, which in turn must depend on investor beliefs about quality.

Easier to satisfy for Firm H than for Firm L if

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

Two incentive constraints.
One for $q = H$, high quality.
One for $q = L$, low quality.
Only the left-hand side of these constraints that differ. The right-hand side is just Q^E/Q^A , independent of true quality q .

Activity - revisited

Consider a firm of either high or low quality, in the framework of Edmans and Mann (2019). The firm needs to raise an amount $F > 0$ either by selling assets or issuing equity, to invest in a 0 NPV project.

Which of the following statements best reflects the **Balance sheet effect**?

- A) A larger value of F will increase the firm's incentive to sell assets, in particular if firm quality is high
- B) A larger value of F will increase the the firm's incentive to sell assets, in particular if firm quality is low
- C) A larger value of F will increase the firm's incentive to sell equity, in particular if firm quality is high
- D) A larger value of F will increase the firm's incentive to sell equity, in particular if firm quality is low

Discuss in groups: both regarding the best answer, and the intuition for this answer. Then submit your answer at socrative.com, room 897458.

most popular and correct!



$$\frac{A_H}{C_H + A_H + F} > \frac{A_L}{C_L + A_L + F}$$

$$\frac{A_H}{A_L} > \frac{C_H + A_H + F}{C_L + A_L + F} \leftarrow \begin{array}{l} \text{greater} \\ \text{than 1} \end{array}$$

$\hookrightarrow$ greater than 1

Let F increase: As $F \rightarrow \infty$, R.H.S. $\rightarrow 1$.

Then the inequality is satisfied $\rightarrow$ large F , high quality firms have a greater incentive to sell equity than low quality firms

Payoffs



Balance sheet effect

When F is large, effectively reduces to $A_H > A_L$ which always holds

-----> Firm H has a greater incentive to sell equity (rather than sell assets) than Firm L whenever the amount it needs to raise is sufficiently large.

We can rewrite

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

info asymmetry assets $\rightarrow \left\{ \frac{A_H}{A_L} > \frac{C_H + A_H + F}{C_L + A_L + F} \right.$

info asymmetry equity

We can also rewrite:

$$A_L(C_H + A_H + F) < A_H(C_L + A_L + F)$$

or equivalently:

$$F > \frac{C_H A_L - C_L A_H}{A_H - A_L} \equiv F^*$$

Interpretation: $F^* > 0$ means that the information asymmetry of the non-core asset is less than that of the core asset. In this case:

- for “large” investment, Firm H has more incentive to sell equity than Firm L
- for “small” investment, Firm H has more incentive to sell assets than Firm L

Role of F captures the Balance sheet effect



Intuition for balance sheet effect

Hence, if $F^* > 0$, we have the following:

- for **large investment**, **Firm H** has more incentive to **sell equity** than Firm L
- for **small investment**, **Firm H** has more incentive to **sell assets** than Firm L

Why is this the case?

- Firm H suffers from information asymmetry (lemons problem)
- Both for selling (non-core) assets and issuing equity
- Equity price incorporates claim to funding raised, F , which enters on Firm's **balance sheet**. Independent of firm quality -> reduces lemons problem
- When F is large, equity exhibits little info asymmetry. **Balance sheet effect** increases Firm H's incentive to sell equity, relative to Firm L



Balance sheet effect with synergies

Suppose that when Firm sells non-core assets with "true" value A_q , total firm value falls by $A_q(1 + k)$.

- Parameter k capture synergies within Firm
- Modeled in such a way so as not to affect Investor payoff
- Suppose that k take on the same value for Firm H and Firm L
- Earlier slides assumed that $k = 0$.

Question: how does the Balance sheet effect influence the relative incentive of Firm H and Firm L to sell equity, in the presence of synergies ($k \neq 0$)?

Let's check whether Firm H still has more incentive to sell equity than Firm L if and only if

$$F^* > \frac{C_H A_L - C_L A_H}{A_H - A_L}$$



Impact of synergies

Q^A : amount of (non-core) asset that must be sold to raise F

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

Both Q^A and Q^E are independent of the Firm's actual quality, q .

Payoff from selling assets:

$$C_q + (1 - Q^A)A_q - kQ^A A_q + F$$

new term
synergies.

Payoff from issuing equity:

$$(1 - Q^E)(C_q + A_q + F)$$

Firm will sell equity if

$$Q^A A_q (1 + k) > Q^E (C_q + A_q + F)$$

Value of assets sold must exceed value of equity sold

Impact of synergies

Firm will sell equity if

$$Q^A A_q (1 + k) > Q^E (C_q + A_q + F)$$

Rewrite:

$$\frac{A_q}{(C_q + A_q + F)} > \frac{Q^E}{Q^A (1 + k)}$$

Not not
depend - due
quality

Easier to satisfy for Firm H than for Firm L if

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

Same condition as before! Condition $F > F^*$ unchanged, independent of k

-----> synergies do not affect the incentive of Firm H to sell equity, **relative** to Firm L. Intuitively, synergy parameter is the same for H and L.

-----> same idea in the paper: k is drawn independently of q

Asset-pooling equilibrium (APE)

Firm will sell assets if

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

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

Price is equal to value perceived by Investor.

Asset-pooling equilibrium: $\pi A_H + (1 - \pi) A_L$ (Bayes' Rule)

Posterior =
Prior

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

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

Off the equilibrium path: assume investors hold pessimistic beliefs. They interpret selling equity (zero probability event), as revealing low quality for sure.

Price is equal to value perceived by Investor.

Asset-pooling equilibrium: $C_L + A_L + F$ (out-of-equilibrium beliefs).

Implies: $Q^E = F / (C_L + A_L + F)$



Asset-pooling equilibrium (APE)

Firm will sell assets if

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

Substitute for Q^A and Q^E and rearrange to obtain following inequality (*):

$$\frac{\cancel{F} A_q}{\cancel{F} (C_q + A_q + F)} < \frac{\pi A_H + (1 - \pi) A_L}{C_L + A_L + F}$$

Handwritten derivation for Firm L:

$$\frac{A_L}{C_L + A_L + F} < \frac{\pi A_H + (1 - \pi) A_L}{C_L + A_L + F}$$

For Firm L, (*) always holds:

$$A_L < \pi A_H + (1 - \pi) A_L$$

Suppose $F < F^*$. Then Firm H has more incentive to sell assets than Firm L. Hence, (*) must hold for Firm H as well. Equilibrium!

Equity-pooling equilibrium (EPE)

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

Price is equal to value perceived by Investor.

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

Implies: $Q^A = F/A_L$

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

Price is equal to its value as perceived by Investors.

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

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

as before, assume
are pessimistic
off the
equilibrium
path

} Similar
to APE

Equity-pooling equilibrium (EPE)

Firm will sell equity if

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

Substitute for Q^A and Q^E and rearrange to obtain following inequality (**):

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

For Firm L, (**) always holds:

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

The incentive constraint for the low quality firm holds.
The low quality firm prefers selling equity to selling assets.

What about the high quality firm=

Suppose $F > F^*$. Then Firm H has more incentive to sell equity than Firm L. Hence, (**) must hold for Firm H as well. Equilibrium!



Summing up: APE and EPE

We have seen:

- An asset-pooling equilibrium exists when $F < F^*$
- An equity-pooling equilibrium exists when $F > F^*$

Propositions 3 also (i) takes into account synergies, and (ii) voluntary capital raising.

Question: We saw that Firm L never has an incentive to deviate from a candidate APE or EPE, regardless of parameter values. What is the economic intuition for this result (i.e. why does only Firm H's incentive constraint matter, not Firm L's)?

Discuss in groups of 3-4, for 4 minutes. Then go to m.socrative.com, enter room number **897458**, and write a short answer (a few sentences).



Summing up: APE and EPE

Question: We saw that Firm L never has an incentive to deviate from a candidate APE or EPE, regardless of parameter values. What is the economic intuition for this result (i.e. why does only Firm H's incentive constraint matter, not Firm L's)?

By following equil. strategy, Firm L always increases its value

- In APA, sells overvalued assets

- In EPE, sells overvalued equity

Either way, take advantage of asymmetric information

By deviating, Firm L's value is always unchanged

- In APA, sells fairly-valued equity

- In EPE, sells fairly-valued assets

Reason: Investor is pessimistic when seeing surprising claim

Low quality firm, in equilibrium, is selling overpriced claims. It is happy to do so, rather than deviate and sell another claim at a "fair" (i.e. low) value.

High quality firm, in equilibrium, is selling underpriced claims



Intended outcomes for the day:

1. **To mathematically derive** how the Balance Sheet Effect in Edmans and Mann (2019) affects firm incentives to sell assets vs. equity. Pushes firms to sell equity, in particular high quality firms.
2. To **analyze** the role that quality and synergies play in the Balance Sheet Effect. Synergies directly affect a firm's incentive to sell assets vs equity, but in a ways that is independent of firm quality. No impact on Balance Sheet Effect.
3. **To intuitively describe** why the incentive constraint of high-quality firms, but not that of low-quality firms, matters for pooling equilibria. Low-quality firm does not face lemons problem, always benefits from selling overvalued claims.



For next time

Read Section 2.2 of the Edmans and Mann article, along with Section 3. Review briefly the other sections of the article.

For Proposition 4, which has many parts, focus on understanding the "camouflage effect" (see the discussion in the text following the proposition)

Complete the assignment in the module for Lecture 7, regarding how the results in the Edmans and Mann article due to the Balance Sheet Effect relate to the intuition from Pecking Order Theory

Prepare an answer to the question on slide 20 of the posted slides for Lecture 7: "Consider the plight of Robert Warren "Bob" Dudley" and be ready to share in class.

