FIN 325 Corporate Finance
L12 (Theory): Information Asymmetry

Instructor: Adam Hal Spencer[1]

Summer 2016

---
[1]Departments of Economics and Finance, UW–Madison.

Motivation

- How does capital structure affect firm value when insiders have more information than outsiders?

- Capital structure acts as a **signal** to the market.

- Share repurchases and debt issuances can serve as positive signals.

- Share issuance is a negative signal.

- This is one of the deepest and most difficult topics we'll cover in the class.

Example: debt as a positive signal (1)

- Consider a firm in a two period example with no discounting.

- The firm has a sole project that can be successful or unsuccessful.

- In the successful state, the firm's value is \$150b at $t = 1$.

- In the unsuccessful state, it's value is \$70b at $t = 1$.

- The market currently views the two states as being equally-likely.

- The state of the firm will be revealed to all at $t = 1$.

- But the managers of the firm know at $t = 0$ whether the firm has been successful or unsuccessful.

- Assume that there is a significant cost of financial distress in the case of bankruptcy.

- Assume no discounting.

Example: debt as a positive signal (2)

- Can the successful firm use a debt issuance as a signal that it is successful?

- The market currently forms an expectation such that the firm has value
  \$110b at $t = 0$, $(0.5(150) + 0.5(70))$.

- Say the firm has the opportunity to to issue \$100b in debt and to use it to
  pay a dividend.

- If the firm is unsuccessful, they will go **bankrupt** next period.

    - Potential costs associated with the firm going bankrupt.

- If the firm is successful, they can issue the debt **without** going bust.

    - Issuing the debt can potentially be a positive signal to investors.

Credibility principle (1)

- The signal is **credible** when the debt issuance is **too costly for the unsuccessful firm type**.

- When the signal is credible, the market will adjust its expectations accordingly.

- All the investors will believe that the firm was successful.

- In the previous example, investors will believe the firm is valued at $150b **rather than** the expected value of $110b.

Credibility principle (2)

- Which of the following signals are likely to be credible?
  - The company's CEO issues a statement saying that the firm was successful.
  - George Foreman issues a statement saying the company was successful.
  - The company's CEO tattoos "the company was successful onto his forehead".

Lemons principle

- Attributable to Akerlof (1970).

- You go to buy a car; there are lemons and peaches in the market.

- Which is which? Only the sellers know.

- If buyers believe that most of the cars are lemons, then they will only be willing to pay a low price.

- Only lemons will sell given the low price.

- Creates an "averse selection".

Adverse selection in securities markets (1)

- The principle extends from cars to securities.

- When managers know a firm is undervalued, he won't want to issue equity.

  - Existing shares will become diluted.

  - If investors believe firm has little value, ownership stake will become **majorly** diluted.

- Manager will happily issue new equity if firm is over-valued.

  - Will enable him to raise funds "on the cheap".

Adverse selection in securities markets (2)

- Market understands that issuance means that firm is more likely to be overvalued.

- The firm may consequently avoid issuing new shares to avoid the associated negative signal.

- Attempt to avoid excessive dilution of mangers' stake and/or that of the shareholders.

- This friction destroys firm value.

Adverse selection example (1)

- Company Q is seeking FDA approval for a new drug, called Roids.

- The firm can invest $100m in a marketing campaign.

- Assume that this campaign will increase the present value of all its current projects.

- Let's assume that Company Q is considering issuing equity to raise the funding for the marketing.

Adverse selection example (2)

- New drug Roids can either be approved or not approved.

    - Insiders know whether the drug was approved or not.

    - Outsiders put 50-50 on each possibility.

    - True state of the firm is revealed next period.

- In case of approval, Roids project generates present value of $150m.

- In case of non-approval, Roids project research facilities can be sold for $50m.

- Investment in marketing costs $100m.

- Assume marketing campaign has PV **of future cash flows** of $120m in approval state and $110m in non-approval state.

Equilibrium (1)

- Things get a little complicated when investors' beliefs get involved...

- For our example: what fraction of the firm will need to be given-up to raise the money for the marketing campaign.

  - We search for the answer **subject to the requirement** that the signals sent by the firm are **credible**.

- Procedure:

  (1) Conjecture management's possible actions.

  (2) Calculate market prices implied by these actions and their implied signals.

  (3) Verify that, given the prices found in **(2)**, the initial conjecture in **(1)** was optimal.

- At the end of this process, if step **(3)** shows that the conjecture was optimal, then we say the conjecture is an **equilibrium**.

Equilibrium (2)

- **Before** any new shares are issued, the market believes the firm is 50–50 an approved or a non-approved type of firm.

- Then the issuance by one or both types of firms sends a signal to the market potentially.

- What signals are credible and what do they mean? Do they reveal anything about the firm's type?

- All depends on the beliefs of the market.

Adverse selection example (3)

- What is the set of possible actions conjectures for this example?

  (A) Both approved and non-approved firms will issue the equity.

  (B) Only the approved firm will issue the equity.

  (C) Only the non-approved firm will issue the equity.

  (D) Neither the approved nor non-approved firms will issue the equity.

- We'll now analyse each of these conjectures in turn to see which of them are equilibria.

- Under which conjectures are the signals sent by the firms **credible**?

Adverse selection example (4): conjecture A

- If this conjecture is true, then **no information** about the approval of Roids is signaled by the equity issuance.

- New investors will still believe there's a 50-50 that it was approved.

- Expected value of the firm is $0.5(150 + 120) + 0.5(50 + 110) = \$215m$.

- What fraction of the firm will the new equityholders demand in exchange for $100m?

  - Fraction will be $\frac{100}{215}$.

  - This fraction is **worth** $100m.

  - Can potentially find the number of shares and market price of shares after issuance from this.

Adverse selection example (5): conjecture A continued

- Does the conjecture satisfy **credibility** — is it consistent with the initial beliefs of the investors?

- Need to check that the implied share of the firm required by the new investors is consistent with **both the approved and non-approved** firm types wanting to issue to undertake the investment.

  - The existing shareholders will be left with $\frac{115}{215}$ fraction of the firm's equity.

  - If the Roids are **approved**, then this is worth $\frac{115}{215}(150 + 120) = \$144.42m$ to the original equityholders.

  - If the Roids are **not approved**, then this stake is worth $\frac{115}{215}(50 + 110) = \$85.58m$ to the original equityolders.

- Need to compare these numbers to what each type of firm would get if **the investment was not undertaken**, (i.e. if the issuance didn't take place).

Adverse selection example (6): conjecture A continued

- If Roids are **approved**, then the equity is valued at $150m if the **issuance doesn't take place**.

- If the Roids are **not approved**, then the equity is worth $50m if the **issuance doesn't take place**.

- To check credibility, compare the value to the original equityholders if they undertake the new project for each firm type.

    - The **approved** firm type will **not** want to undertake the marketing campaign (as $150m > $144.42m).

    - The **non-approved** firm type will **want** to undertake the marketing campaign as (as $85.58m > $50)

- The initial beliefs are inconsistent with the optimal actions of the firms.

- Conjecture A is **not an equilibrium**.

Adverse selection example (7): conjecture A continued

- **Why** is conjecture A not an equilibrium?

- Problem is that the approved type of firm has **too much dilution** of the original shareholders' value under this conjecture.

- New shareholders for the approved type pay \$100m for \$270m$\times\frac{100}{215}=$ \$125.6m worth of shares.

- The dilution to the old shareholders of the approved type **outweighs** the extra value created by the marketing campaign.

Adverse selection example (8): conjecture B

- Under this conjecture, **only the approved firm type** will want to issue.

- Need to check that it's credible for only the approved type to issue and not the non-approved type.

- Under this conjecture, new investors believe the firm is worth $150 + 120 = \$270m$.

- Given this, the new investors will demand $\frac{100}{270}$ fraction of the firm's equity.

Adverse selection example (9): conjecture B continued

- If the **approved type** decides to issue, the value to original equityholders will be $\frac{170}{270}(270) = \$170m$.

  - Larger than their value of $150m without the issuance.

  - Clearly they will find it optimal to issue,

- If the **non-approved type** decides to issue, their value to original equityholders will be $\frac{170}{270}(160) = \$100.74m$.

  - Also larger than the $50m value in the absence of the issuance.

  - Non-approved type **also** finds it optimal to issue new equity and undertake the marketing campaign.

- Again, conjecture B **is not an equilibrium**.

- **Both** types will issue, meaning that signalling that you are the approved type is incredible.

Adverse selection example (10): conjecture C

- This conjecture is that **only the non-approved type** will issue the new equity to undertake the marketing campaign.

- Under this conjecture, share issuance signals a non-approved type of firm.

- New investors will demand $\frac{100}{160}$ fraction of the firm in return for the upfront investment cost.

- So the old equityholders will be left with $\frac{60}{160}$ of the firm.

- Need to check that the non-approved firm has incentive to issue in addition to the approved firm not having incentive for the signal to be credible.

Adverse selection example (11): conjecture C continued

- If the **non**-**approved** firm decides to issue, then the original equityolders get $\frac{60}{160}(160) = \$60m$.

  - Higher than the \$50m in value if they decided **not to issue**.

  - Non-approved firm type has incentive to issue and undertake marketing campaign.

- If the **approved** firm decides to issue then the original equityholders get $\frac{60}{160}(270) = \$101.25m$.

  - Which is less than the \$150m value they get without the additional investment in marketing.

  - Approved firm type has no incentive to issue under this conjecture.

- Signal that the firm is non-approved type is **credible** under this conjecture.

- Conjecture C **is an equilibrium**!

Adverse selection example (12): conjecture D

- Under this conjecture, **neither firm** is postulated to issue and undertake the marketing campaign.

- Similarly to conjecture A, if either firm decides to issue, then **no signal is sent**.

  - So investors believe it could be either firm type with 50–50 probability.

  - The calculations are the same as in conjecture A.

  - **Approved** type will have no incentive to issue.

  - **Non-approved** type will have incentive to issue.

  Conjecture D is **not an equilibrium** since non-approved type **will issue** even though we conjectured that they **wouldn't**.

Adverse selection example (13): conclusions

- The non-approved type goes ahead and issues the shares.

- Sends a negative signal to the market.

- The approved type doesn't issue as it would dilute the ownership stake too much.

- Cost of the dilution outweighs the positive NPV of the project.

- **This friction** can lead to really profitable firms forgoing positive NPV projects.

- Can be thought of as a **cost of external finance**.

Signalling and alternative securities

- Some types of securities are less sensitive to asymmetric information friction.

- Securities that are less sensitive have:
    - Higher seniority,
    - Shorter maturity,
    - Better collateralisation,
    - Bought by better informed providers of capital.

Pecking order theory of capital structure (1)

- **Pecking order theory** says that firms will first turn to securities that are **less sensitive** to asymmetric information and then work their way down to **more sensitive** sources.

- Rough pecking order:

    (1) Retained earnings,

    (2) Short term bank debt,

    (3) Public debt,

    (4) Common equity.

Pecking order theory of capital structure (2)

- Sylised fact: firms that are more profitable tend to have lower leverage.

- Can be partially explained by the pecking order theory.

- Firms with more profits have less of a need to turn to external financing sources.

- Allows them to save on paying a cost of external finance.

- Pecking-order theory ultimately suggests that **financial flexibility** is valued by firms to avoid external issuance costs.

APV method revisited

- We can revise the APV formula as

  $V_L = V_U + PV(DTS) - PV(CFD)$
  $- PV(\text{Agency Costs of Leverage}) + PV(\text{Agency benefits of leverage})$
  $+ PV(\text{Effects of information asymmetry}).$

- E.g. the all-equity firm may forgo a positive NPV project due to the expectations of the market and the associated cost of equity financing.

  - In this case issuing debt may instead allow them to take the project, meaning that V_L will be higher than V_U by the project's cash flow — which is the term PV(Effects of information asymmetry).

Empirical evidence (1): debt policy determinants

Debt policy factors

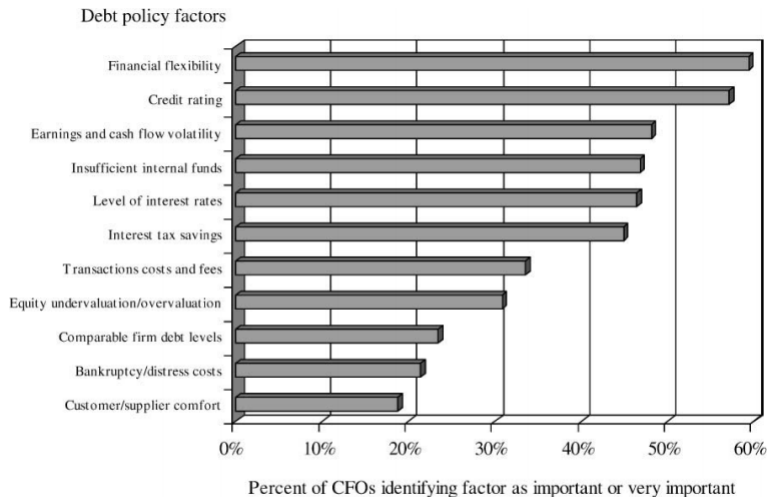Percent of CFOs identifying factor as important or very important

Fig. 5. Survey evidence on some of the factors that affect the decision to issue debt. The survey is based on the responses of 392 CFOs.
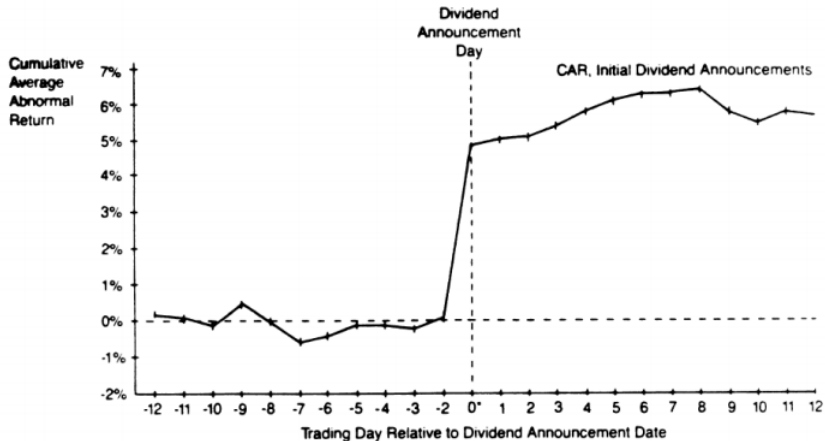
Figure 1: Graham & Harvey (2001) JFE

Empirical evidence (2): equity transactions

- What are the price reactions to different types of equity transactions?
  - Initial dividend payments.
  - Share repurchases.
  - Share issuances.

- Evidence given by Asquith & Mullins (1986).

Exhibit 1. Abnormal Stock Returns for Initial Dividend Announcements

*Day 0 is the publication date in *The Wall Street Journal*. Since *The Wall Street Journal* is a morning newspaper, the information in articles is often made public before the end of trading on the day before publication. For this reason the abnormal returns for days −1 and 0 have been aggregated to arrive at the announcement day return reported above.

Exhibit 3. Abnormal Stock Returns for Largest Subsequent Dividend Increase
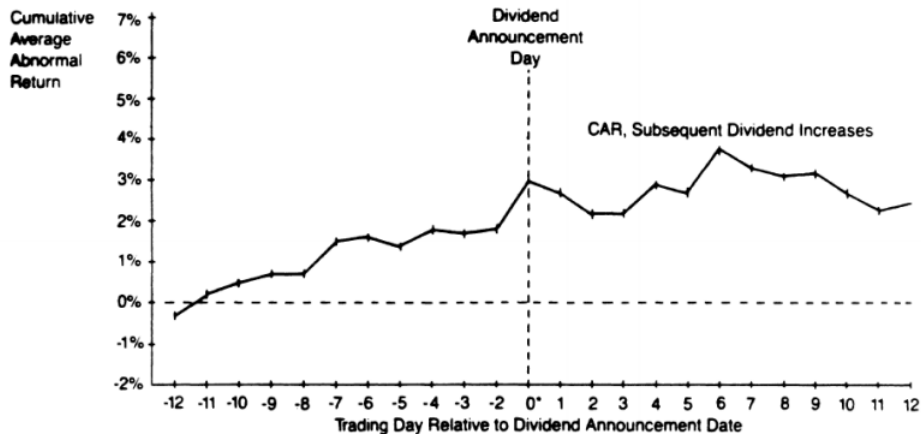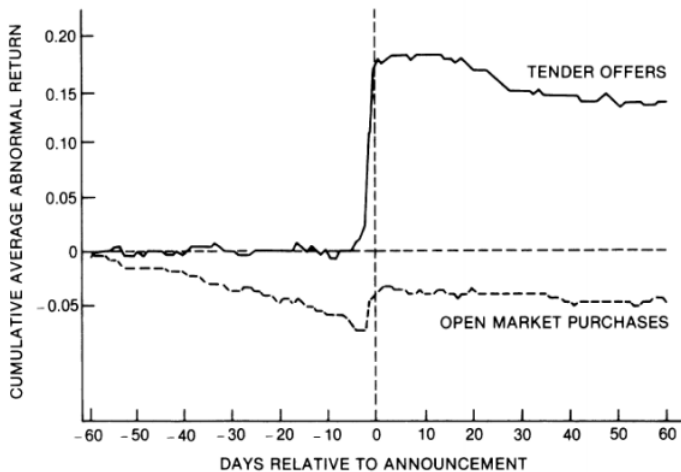
Why issue dividends?

- Historically dividend payments have come at a disadvantage to repurchases for tax purposes.

- So why issue dividends?

- They may be a signal of future earnings — trying to signal that the firm is "good type". Why the difference between **initial** and **subsequent** dividend

  issuances in terms of market reactions?

  - Initial dividends are a commitment to keep paying.

  - Market may come to **expect** their payment.

  - **Stopping** the payment of dividends may end up being a bad signal.

Empirical evidence (5): equity transactions

Exhibit 5. Abnormal Stock Returns for Stock Repurchase Announcements

Source: "Common Stock Repurchases and Market Signalling" by Theo Vermaelen, *Journal of Financial Economics*, Volume 9 (1981), p.

Why undertake share repurchases?

- Recall that under MM world, the share price **should not react** to a share repurchase.

- Repurchase in asymmetric information world **signals that the shares are undervalued**.

- Tender offers v.s. open market purchases — why the difference?

    - **Tender offer** — approach the investors directly. Shares are usually bought **at a premium**.

    - **Open market** — just buy on the market as an individual investor would.

- Paying the premium in the tender offer means that the shares are **really** undervalued.

- Why the negative reaction in the open market purchases? Seems like the theory might be missing something.

Exhibit 6. Abnormal Stock Returns for Seasoned Equity Issues
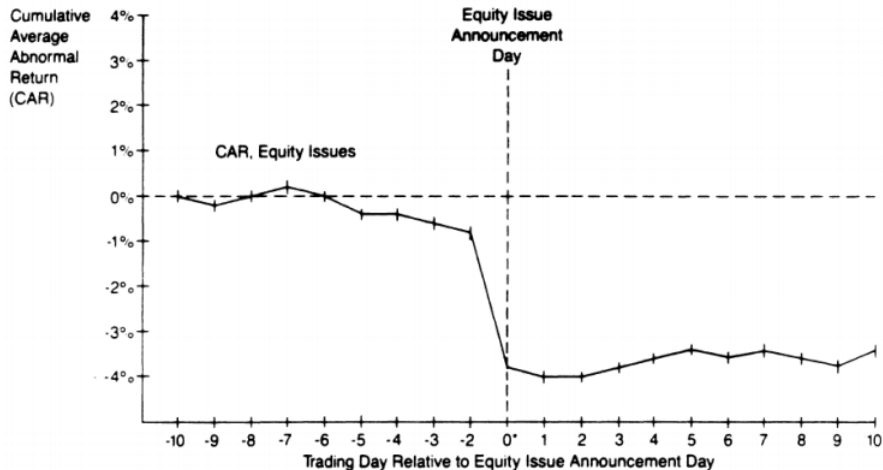
Why issue new equity?

- Again the stock price should be unaffected if MM holds.

- In the presence of information asymmetry, the issuance can signal that the firm is **overvalued**.

- Consequently, the price falls after an issuance.

- Average price drop of around 2%.

- Drop can represent up to 30% of raised capital.

- Transfer from old shareholders to new shareholders.

Takeaways

- When the managers of the firm have **private information**, capital structure decisions can send signals to the market.

- Debt and dividends are positive signals.

- The sale of equity securities can send negative signals.

- Pecking order theory predicts that firms always prefer to issue securities that are less information-sensitive.