



Andreas Krause

Adverse selection and financing choices

Information asymmetry

Information asymmetry

- Companies often have **better information** about their value than outside investors

Information asymmetry

- ▶ Companies often have better information about their value than outside investors
- ▶ The value of equity as assessed by these outside investors will then **not accurately** reflect its value

Information asymmetry

- ▶ Companies often have better information about their value than outside investors
- ▶ The value of equity as assessed by these outside investors will then not accurately reflect its value
- ▶ If the true value of the equity is high, the equity will be **undervalued**

Information asymmetry

- ▶ Companies often have better information about their value than outside investors
- ▶ The value of equity as assessed by these outside investors will then not accurately reflect its value
- ▶ If the true value of the equity is high, the equity will be undervalued
- ▶ If the true value of the equity is low, the equity will be **overvalued**

Information asymmetry

- ▶ Companies often have better information about their value than outside investors
- ▶ The value of equity as assessed by these outside investors will then not accurately reflect its value
- ▶ If the true value of the equity is high, the equity will be undervalued
- ▶ If the true value of the equity is low, the equity will be overvalued
- ▶ Financing decisions can reveal the **true type** of company

Information asymmetry

- ▶ Companies often have better information about their value than outside investors
- ▶ The value of equity as assessed by these outside investors will then not accurately reflect its value
- ▶ If the true value of the equity is high, the equity will be undervalued
- ▶ If the true value of the equity is low, the equity will be overvalued
- ▶ Financing decisions can reveal the true type of company

Company types

Company types

- ▶ A company may be of high or low value: $V_H > V_L$

Company types

- ▶ A company may be of high or low value: $V_H > V_L$
- ▶ The company **knows its value**

Company types

- ▶ A company may be of high or low value: $V_H > V_L$
- ▶ The company knows its value, but investors do **not have this information**

Company types

- ▶ A company may be of high or low value: $V_H > V_L$
- ▶ The company knows its value, but investors do not have this information
- ▶ It has an investment opportunity that will generate a **known outcome**

Company types

- ▶ A company may be of high or low value: $V_H > V_L$
- ▶ The company knows its value, but investors do not have this information
- ▶ It has an investment opportunity that will generate a known outcome
- ▶ To finance this investment, the company needs to **raise funds**

Company types

- ▶ A company may be of high or low value: $V_H > V_L$
- ▶ The company knows its value, but investors do not have this information
- ▶ It has an investment opportunity that will generate a known outcome
- ▶ To finance this investment, the company needs to raise funds

Investors providing equity

Investors providing equity

- The company can raise **outside equity** if investors make profits
- E

Investors providing equity

- ▶ The company can raise **outside equity** if investors make profits
- ▶ Investing in equity, investors will obtain their **fraction of the value** generated by the **existing company**
- ▶ $E \leq \lambda (V -)$

Investors providing equity

- ▶ The company can raise **outside equity** if investors make profits
- ▶ Investing in equity, investors will obtain their **fraction of the value** generated by the **existing company** and the **new investment**
- ▶ $E \leq \lambda (V + \hat{V})$

Investors providing equity

- ▶ The company can raise **outside equity** if investors make profits
- ▶ Investing in equity, investors will obtain their **fraction of the value** generated by the **existing company** and the **new investment**
- ▶ Investors do not know the value of the company but form expectations:
$$V = pV_H + (1 - p)V_L$$
- ▶ $E \leq \lambda (V + \hat{V})$

Investors providing equity

- ▶ The company can raise outside equity if investors make profits
- ▶ Investing in equity, investors will obtain their fraction of the value generated by the existing company and the new investment
- ▶ Investors do not know the value of the company but form expectations:

$$V = pV_H + (1 - p)V_L$$

$$▶ E \leq \lambda (V + \hat{V})$$

$$\Rightarrow \lambda \geq \frac{E}{V + \hat{V}}$$

Investors providing equity

- ▶ The company can raise outside equity if investors make profits
- ▶ Investing in equity, investors will obtain their fraction of the value generated by the existing company and the new investment
- ▶ Investors do not know the value of the company but form expectations:
$$V = pV_H + (1 - p)V_L$$
- ▶ $E \leq \lambda (V + \hat{V})$
- ⇒ $\lambda \geq \frac{E}{V + \hat{V}}$
- ▶ If investors are **competitive** they will only obtain the minimum fraction of the company

Investors providing equity

- ▶ The company can raise outside equity if investors make profits
- ▶ Investing in equity, investors will obtain their fraction of the value generated by the existing company and the new investment
- ▶ Investors do not know the value of the company but form expectations:
$$V = pV_H + (1 - p)V_L$$
- ▶ $E \leq \lambda (V + \hat{V})$
- ⇒ $\lambda \geq \frac{E}{V + \hat{V}}$
- ▶ If investors are competitive they will only obtain the minimum fraction of the company

Companies raising equity funds

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company
- ▶ $\hat{\Pi}_C^i = (1 - \lambda)$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose **value** they know
- ▶ $\hat{\Pi}_C^i = (1 - \lambda) \begin{pmatrix} V_i \\ \end{pmatrix}$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose **value** they know, in addition to the value generated by the **new investment**
- ▶ $\hat{\Pi}_C^i = (1 - \lambda) (V_i + \hat{V})$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose value they know, in addition to the value generated by the new investment
- ▶
$$\hat{\Pi}_C^i = (1 - \lambda) (V_i + \hat{V})$$
$$= \frac{V + \hat{V} - E}{V + \hat{V}} (V_i + \hat{V})$$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose value they know, in addition to the value generated by the new investment
- ▶
$$\begin{aligned}\hat{\Pi}_C^i &= (1 - \lambda) \left(V_i + \hat{V} \right) \\ &= \frac{V + \hat{V} - E}{V + \hat{V}} \left(V_i + \hat{V} \right)\end{aligned}$$
- ▶ If not making the investment, the existing owners obtain $\Pi_C^i = V_i$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose value they know, in addition to the value generated by the new investment
- ▶
$$\begin{aligned}\hat{\Pi}_C^i &= (1 - \lambda) (V_i + \hat{V}) \\ &= \frac{V + \hat{V} - E}{V + \hat{V}} (V_i + \hat{V})\end{aligned}$$
- ▶ If not making the investment, the existing owners obtain $\Pi_C^i = V_i$
- ▶ They make the investment by raising equity if $\hat{\Pi}_C^i \geq \Pi_C^i$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose value they know, in addition to the value generated by the new investment
- ▶
$$\begin{aligned}\hat{\Pi}_C^i &= (1 - \lambda) (V_i + \hat{V}) \\ &= \frac{V + \hat{V} - E}{V + \hat{V}} (V_i + \hat{V})\end{aligned}$$
- ▶ If not making the investment, the existing owners obtain $\Pi_C^i = V_i$
- ▶ They make the investment by raising equity if $\hat{\Pi}_C^i \geq \Pi_C^i$

$$\Rightarrow p \geq p_i^* = \frac{V_i E - (V_L + \hat{V} - E) \hat{V}}{\hat{V} (V_H - V_L)}$$

Companies raising equity funds

- ▶ Existing company owners retain their fraction of the company, whose value they know, in addition to the value generated by the new investment
- ▶
$$\begin{aligned}\hat{\Pi}_C^i &= (1 - \lambda) \left(V_i + \hat{V} \right) \\ &= \frac{V + \hat{V} - E}{V + \hat{V}} \left(V_i + \hat{V} \right)\end{aligned}$$
- ▶ If not making the investment, the existing owners obtain $\Pi_C^i = V_i$
- ▶ They make the investment by raising equity if $\hat{\Pi}_C^i \geq \Pi_C^i$

$$\Rightarrow p \geq p_i^* = \frac{V_i E - (V_L + \hat{V} - E) \hat{V}}{\hat{V} (V_H - V_L)}$$

Comparing company decisions

Comparing company decisions

- If the company with **high value** would **raise equity** for investment, the company with **low value** would **raise equity** too

Comparing company decisions

- ▶ If the company with high value would raise equity for investment, the company with low value would raise equity too
- ⇒ **No information is revealed** by a company raising equity

Comparing company decisions

- ▶ If the company with high value would raise equity for investment, the company with low value would raise equity too
- ⇒ No information is revealed by a company raising equity
- ▶ If one company does not raise equity while another does, the two company types can be **distinguished**

Comparing company decisions

- ▶ If the company with high value would raise equity for investment, the company with low value would raise equity too
- ⇒ No information is revealed by a company raising equity
- ▶ If one company does not raise equity while another does, the two company types can be distinguished
- ▶ The company **raising equity** will be of **low value**

Comparing company decisions

- ▶ If the company with high value would raise equity for investment, the company with low value would raise equity too
- ⇒ No information is revealed by a company raising equity
- ▶ If one company does not raise equity while another does, the two company types can be distinguished
- ▶ The company raising equity will be of low value, while the company raising **no equity** will be of **high value**

Comparing company decisions

- ▶ If the company with high value would raise equity for investment, the company with low value would raise equity too
 - ⇒ No information is revealed by a company raising equity
- ▶ If one company does not raise equity while another does, the two company types can be distinguished
- ▶ The company raising equity will be of low value, while the company raising no equity will be of high value
 - ⇒ Not raising equity is (potentially) **positive information**

Comparing company decisions

- ▶ If the company with high value would raise equity for investment, the company with low value would raise equity too
 - ⇒ No information is revealed by a company raising equity
- ▶ If one company does not raise equity while another does, the two company types can be distinguished
- ▶ The company raising equity will be of low value, while the company raising no equity will be of high value
 - ⇒ Not raising equity is (potentially) positive information

Company obtaining a loan

Company obtaining a loan

- Companies can raise the same funds through a **loan**

Company obtaining a loan

- ▶ Companies can raise the same funds through a loan
- ▶ In this case the existing owner would **retain the company**
- ▶ $\hat{\Pi}_C^i = V_i + \hat{V}$

Company obtaining a loan

- ▶ Companies can raise the same funds through a loan
- ▶ In this case the existing owner would **retain the company** and **repay the loan**
- ▶ $\hat{\Pi}_C^i = V_i + \hat{V} - (1 + r_L) E$

Company obtaining a loan

- ▶ Companies can raise the same funds through a loan
- ▶ In this case the existing owner would retain the company and **repay the loan**
- ▶ $\hat{\Pi}_C^i = V_i + \hat{V} - (1 + r_L) E$
- ▶ Debt finance is preferred to equity finance if $\hat{\Pi}_C^i \geq \hat{\Pi}_C^i$

Company obtaining a loan

- ▶ Companies can raise the same funds through a loan
- ▶ In this case the existing owner would retain the company and **repay the loan**
- ▶ $\hat{\Pi}_C^i = V_i + \hat{V} - (1 + r_L) E$
- ▶ Debt finance is preferred to equity finance if $\hat{\Pi}_C^i \geq \hat{\Pi}_C^i$

$$\Rightarrow p \leq p_i^{**} = \frac{V_i - r_L \hat{V} - (1 + r_L) V_L}{(1 + r_L)(V_H - V_L)}$$

Company obtaining a loan

- ▶ Companies can raise the same funds through a loan
- ▶ In this case the existing owner would retain the company and **repay the loan**
- ▶ $\hat{\Pi}_C^i = V_i + \hat{V} - (1 + r_L) E$
- ▶ Debt finance is preferred to equity finance if $\hat{\Pi}_C^i \geq \hat{\Pi}_C^i$
- ⇒ $p \leq p_i^{**} = \frac{V_i - r_L \hat{V} - (1 + r_L) V_L}{(1 + r_L)(V_H - V_L)}$
- ▶ If companies of **low value** prefer a **loan**, companies with **high value** would choose a **loan**

Company obtaining a loan

- ▶ Companies can raise the same funds through a loan
- ▶ In this case the existing owner would retain the company and **repay the loan**
- ▶ $\hat{\Pi}_C^i = V_i + \hat{V} - (1 + r_L) E$
- ▶ Debt finance is preferred to equity finance if $\hat{\Pi}_C^i \geq \hat{\Pi}_C^i$
- ⇒ $p \leq p_i^{**} = \frac{V_i - r_L \hat{V} - (1 + r_L) V_L}{(1 + r_L)(V_H - V_L)}$
- ▶ If companies of low value prefer a loan, companies with high value would choose a loan

Distinguishing company types

Distinguishing company types

► If adverse selection is high all companies will choose loans

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low **all companies will raise equity**

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low, $p \geq p_H^*$, all companies will raise equity

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low, $p \geq p_H^*$, all companies will raise equity
- ▶ If adverse selection is **medium** high-value companies will choose loans

Distinguishing company types

- If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- If adverse selection is low, $p \geq p_H^*$, all companies will raise equity
- If adverse selection is medium high-value companies will choose loans and low-value companies will choose **equity**

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low, $p \geq p_H^*$, all companies will raise equity
- ▶ If adverse selection is medium, $p_L^{**} > p > p_H^*$, high-value companies will choose loans and low-value companies will choose equity

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low, $p \geq p_H^*$, all companies will raise equity
- ▶ If adverse selection is medium, $p_L^{**} > p > p_H^*$, high-value companies will choose loans and low-value companies will choose equity
- ▶ For medium adverse selection, the choice of debt or equity (capital structure), **reveals information** about the type of company

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low, $p \geq p_H^*$, all companies will raise equity
- ▶ If adverse selection is medium, $p_L^{**} > p > p_H^*$, high-value companies will choose loans and low-value companies will choose equity
- ▶ For medium adverse selection, the choice of debt or equity (capital structure), reveals information about the type of company
- ▶ This information would then be reflected in the **value of the equity** as seen by **outside investors**

Distinguishing company types

- ▶ If adverse selection is high, $p \leq p_L^{**}$, all companies will choose loans
- ▶ If adverse selection is low, $p \geq p_H^*$, all companies will raise equity
- ▶ If adverse selection is medium, $p_L^{**} > p > p_H^*$, high-value companies will choose loans and low-value companies will choose equity
- ▶ For medium adverse selection, the choice of debt or equity (capital structure), reveals information about the type of company
- ▶ This information would then be reflected in the value of the equity as seen by outside investors



Copyright © by Andreas Krause

Picture credits:

Cover: Premier regard, Public domain, via Wikimedia Commons, [https://commons.wikimedia.org/wiki/File:DALL-E_2_Financial_markets_\(1\).jpg](https://commons.wikimedia.org/wiki/File:DALL-E_2_Financial_markets_(1).jpg)

Back: Rhododendrites, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0/>, via Wikimedia Commons, [https://upload.wikimedia.org/wikipedia/commons/0/04/Manhattan_at_night_south_of_Rockefeller_Center_panorama_\(11263p\).jpg](https://upload.wikimedia.org/wikipedia/commons/0/04/Manhattan_at_night_south_of_Rockefeller_Center_panorama_(11263p).jpg)

Andreas Krause
Department of Economics
University of Bath
Claverton Down
Bath BA2 7AY
United Kingdom

E-mail: mnsak@bath.ac.uk