Delegated Cheap Talk

A Theory of Investment Banking

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What we do

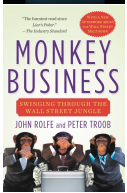
Question "Why are investment banks valuable?"

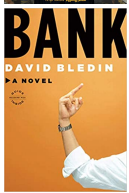
Literature says "They are reputable experts!"

We say "They might just be delegated cheap talkers, but still in an informative way."

Motivation

Popular view about investment bankers





The existing academic view (expertise or reputation) seems at odds with what the general public thinks, what the popular media portray, and what the investment bankers themselves say.

> *"... [Investment bankers] only want to say good things. The better they can make the company sound, the easier it will be for them to sell the securities. The easier it is for them to sell the securities, the more certain they'll be that the clients will be happy. That means fees. Fees are important."*
>
> *— Rolfe and Troob (2009):*
> *Monkey Business: Swinging through the Wall Street jungle*

⇒ Can we formalize this popular view of investment bankers as cheap-talking salesmen?

Background: What investment banks actually do

Helping private firms go public through Initial Public Offerings (IPOs)

- When Mark Zuckerberg wanted to sell the shares of Facebook to the public in 2012, he signed a contract choosing Morgan Stanley as the company's investment bank (or underwriter)
- The investment bank had two crucial responsibilities:
  1. Due diligence: inspecting the company's business and finances
  2. Roadshow: meeting large institutional investors to convince them to buy the shares
- The investment banks bought Facebook's shares at $37.582 (1.1% discount) and resold them to investors at $38, making about $176M

⇒ **Our question**: Can we justify such a contract with our model?


PROSPECTUS

421,233,615 Shares

facebook

CLASS A COMMON STOCK

Facebook, Inc. is offering 180,000,000 shares of its Class A common stock and the selling stockholders are offering 241,233,615 shares of Class A common stock. We will not receive any proceeds from the sale of shares by the selling stockholders. This is our initial public offering and no public market currently exists for our shares of Class A common stock.

We have two classes of common stock, Class A common stock and Class B common stock. The rights of the holders of Class A common stock and Class B common stock are identical, except voting and conversion rights. Each share of Class A common stock is entitled to one vote. Each share of Class B common stock is entitled to ten votes and is convertible at any time into one share of Class A common stock. The holders of our outstanding shares of Class B common stock will hold approximately 96.0% of the voting power of our outstanding capital stock following this offering, and our founder, Chairman, and CEO, Mark Zuckerberg, will hold or have the ability to control approximately 55.9% of the voting power of our outstanding capital stock following this offering.

Our Class A common stock has been approved for listing on the NASDAQ Global Select Market under the symbol "FB."

We are a "controlled company" under the corporate governance rules for NASDAQ-listed companies, and our board of directors has determined not to have an independent nominating function and instead to have the full board of directors be directly responsible for nominating members of our board.

Investing in our Class A common stock involves risks. See "Risk Factors" beginning on page 12.

PRICE $38.00 A SHARE

	Price to Public	Underwriting Discounts and Commissions	Proceeds to Facebook	Proceeds to Selling Stockholders
Per share	$38.00	$0.418	$37.582	$37.582
Total	$16,006,877,370	$176,075,651	$6,764,760,000	$9,066,041,719

We and the selling stockholders have granted the underwriters the right to purchase up to an additional 63,185,042 shares of Class A common stock to cover over-allotments.

The Securities and Exchange Commission and state regulators have not approved or disapproved of these securities, or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

Facebook's IPO

Main results

1. **Successful contracts** — Any successful contract requires that the intermediary (investment bank) shares the risk of loss with the buyer (investor)

2. **Optimal contracts** — Any seller-optimal contract satisfies a minimally sufficient incentive alignment between the intermediary and the buyer

3. **Return on investment** — In a seller-optimal contract, the intermediary earns a higher return on investment than the buyer

Related literature

Investment banking

- Existing models customarily derive the value of investment banks from expertise* or reputation**

  * Baron and Holmström (1980); Baron (1982); Ramakrishnan and Thakor (1984); Biais et al. (2002)
  ** Beaty and Ritter (1986); Booth and Smith II (1986); Carter and Manaster (1990); Chemmanur and Fulghieri (1994)

- These models have mixed empirical support (e.g. Ritter and Welch, 2002), but recent works continue to broadly conform to either views

Strategic communication

- Several papers* endogenize how Sender acquires information before cheap talk

  * Austen-Smith (1994); Pei (2015); Argenziano et al. (2016); Kreutzkamp (2022); Lou (2022); Lyu and Suen (2022)

- We go further and endogenize the conflict of interest. A separate designer (seller) offers a contract; Sender's (intermediary's) credibility arises through the contract

Model

Model

Agents Seller (entrepreneur), Intermediary (investment bank), and Buyer (investor)

States "Opening price" $\omega \in \Omega = \{0, 1\}$, the market value of Seller's firm when its shares start trading on the stock market. Prior probability is $p = \Pr(\omega = 1)$

Actions $a \in A = \{0, 1\}$, indicating the buyer not investing (0) and investing (1). If he invests, he pays a predetermined "net offering price" $\kappa \in (p, 1)$.

Contract In **Stage 0** ("contracting stage"), Seller offers $t = (t_0, t_1) \in \mathbb{R}^2$, where t_ω is the amount Intermediary receives from Buyer when $a = 1$ and the state is ω

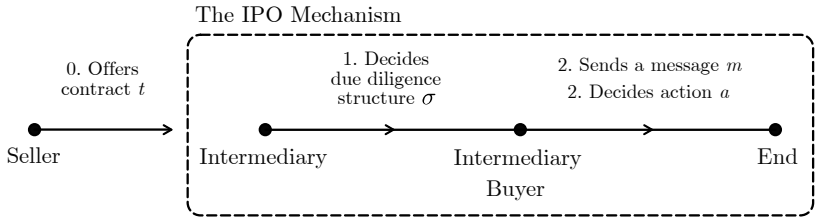
IPO Mechanism If Intermediary accepts the offer, it enters a game with Buyer (next slide). If Intermediary rejects the offer, Seller keeps his firm and others get 0.

The Initial Public Offering (IPO) Mechanism

Game between Intermediary and Buyer

Information structure In **Stage 1** ("due diligence stage"), Intermediary publicly chooses a due diligence structure $\sigma \in \Sigma = \{\sigma' : \Omega \longrightarrow \Delta(\mathcal{S})\}$, where $\mathcal{S} = \{s_0, s_2, \ldots, s_{J-1}\}$ is a set of signals. It privately observes a realized signal $s \in \mathcal{S}$

Cheap talk In **Stage 2** ("roadshow stage"), Intermediary sends a message $m \in \mathcal{M} = \mathcal{S}$ to Buyer. The message is cheap: **(a)** costless, **(b)** non-verifiable, and **(c)** nonbinding. Buyer chooses $a \in A = \{0, 1\}$.



Payoffs and Strategies

Payoffs

Seller gets $u^S(\omega, a) = \kappa a + p \cdot (1 - a)$,

Intermediary gets $u^I_{t,\sigma}(\omega, a) = t_\omega a - C(\sigma)$,

Buyer gets $u^B_t(\omega, a) = (-\kappa + \omega - t_\omega)a$.

Cost of due diligence

$C(\sigma) = \sum_{j=0}^{J-1} P_\sigma(q_j)c(q_j)$, a posterior-separable cost function where

- q_j are posteriors induced by σ with probabilities $P_\sigma(q_j)$
- $c(\cdot)$ is smooth, strictly convex, and has steep boundaries

Strategies

Intermediary's strategy is $(\sigma, \boldsymbol{\mu})$ where $\boldsymbol{\mu} = \{\mu_\sigma : \mathcal{S} \longrightarrow \Delta(\mathcal{M})\}_{\sigma \in \Sigma}$ is a collection of message rules. **Buyer's strategy** is $\boldsymbol{\alpha} = \{\alpha_\sigma : \mathcal{M} \longrightarrow A\}_{\sigma \in \Sigma}$, a collection of action rules.

Equilibrium and Optimal Contract

Equilibrium A strategy profile $(\sigma, \boldsymbol{\mu}, \boldsymbol{\alpha})$ is an equilibrium if **(a)** it is the strategy profile of a pure-strategy sequential equilibrium of the IPO game and **(b)** it is not Pareto-dominated

Outcome A success rate of a strategy profile $(\sigma, \boldsymbol{\mu}, \boldsymbol{\alpha})$ is the probability of the buyer investing $(a = 1)$:

$$\rho = \mathbb{E}_{\omega,s,m}[\alpha_\sigma(m)].$$

Optimal Contract Let $\mathcal{E}(t)$ denote the set of equilibria of the IPO mechanism under a contract $t = (t_0, t_1)$. A contract t^* is seller-optimal (or optimal) if

$$t^* \in \underset{t \in \mathbb{R}^2}{\operatorname{argmax}} \left[\sup_{(\sigma,\boldsymbol{\mu},\boldsymbol{\alpha}) \in \mathcal{E}(t)} U^S(\sigma, \mu_\sigma, \alpha_\sigma) \right].$$

Results

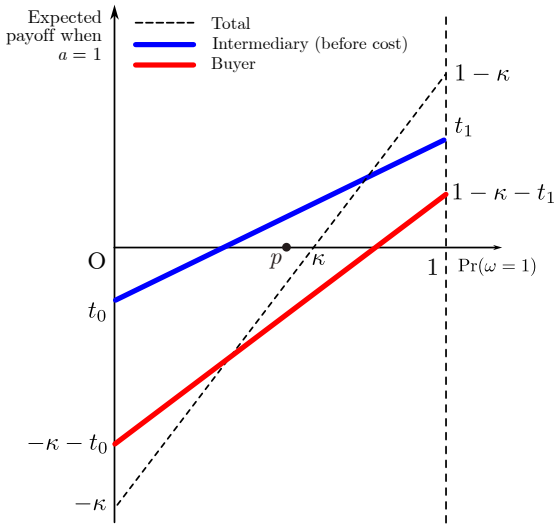
Property of a successful contract

Theorem

Suppose a contract $t = (t_0, t_1)$ *implements a success rate* $\rho > 0$*. The contract satisfies* $t_0 \in [-\kappa, 0)$ *and* $t_1 \in (0, 1 - \kappa]$.

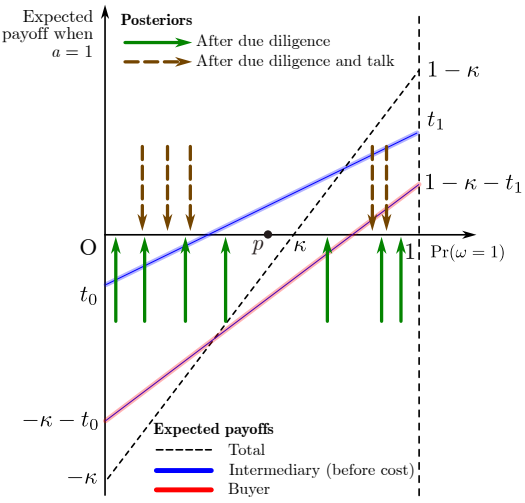
- The intermediary must share the risk of loss with the buyer.
- This result is consistent with the observed phenomonen that most IPO contracts in the U.S. are "firm commitment" contracts (state-contingent transfers) rather than "best-efforts" contracts (constant transfers)

A successful contract requires a joint risk of loss



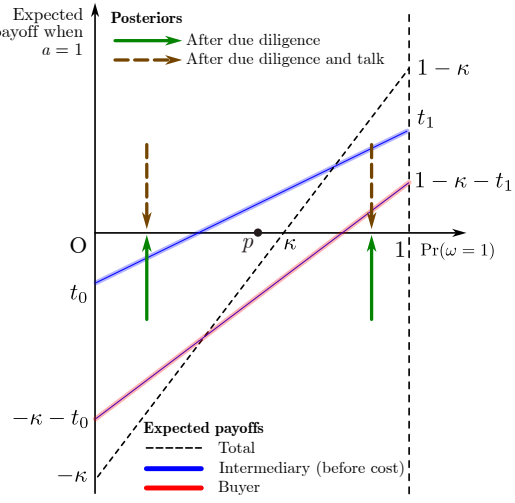
Key step of proof: when could the intermediary's talk be informative?

Consider an equilibrium $(\sigma, \boldsymbol{\mu}, \boldsymbol{\alpha})$ with a positive success rate $\rho > 0$.



How the posteriors should actually look like in equilibrium

They satisfy (a) fully revealing messages, (b) incentive alignment, and (c) binary due diligence



Defining incentive alignment

- Let $V_t^I(q)$ and $V_t^B(q)$ denote the expected payoffs for the intermediary and buyer given a contract $t = (t_0, t_1)$ and posterior $q \in [0,1]$ when $a = 1$

Definition

Suppose a due diligence structure σ induces a pair of posteriors

$$(\ell, r) \in [0, p) \times (p, 1].$$

The due diligence structure σ satisfies **incentive alignment (IA)** if

$$V_t^I(\ell)V_t^B(\ell) \geq 0 \quad \text{and} \quad V_t^I(r)V_t^B(r) \geq 0.$$

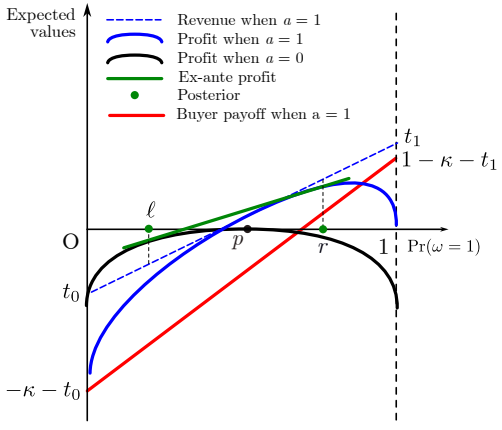
It satisfies **minimal (sufficient) incentive alignment** if it satisfies IA and

$$V_t^B(r) = 0.$$

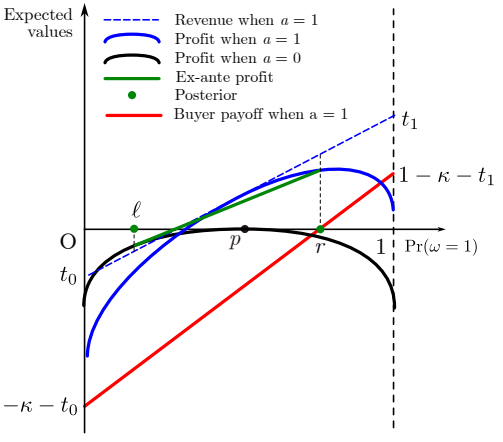
Illustration of minimal incentive alignment

while keeping σ incentive-compatible with the intermediary

(a) Not minimal



(b) Minimal



Optimal contracts satisfy minimal incentive alignment

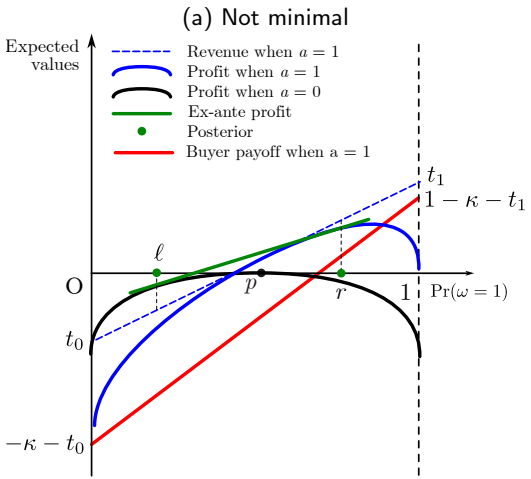
Theorem

Suppose a contract $t = (t_0, t_1)$ is seller-optimal, implementing the highest success rate $\rho^* > 0$ with equilibrium $(\sigma, \boldsymbol{\mu}, \boldsymbol{\alpha})$. The due diligence structure σ is minimally incentive-aligned under t^*.

- This implies that we can restrict attention to (t, σ) that satisfies minimal IA.
- In other words, finding the seller-optimal contract is equivalent to maximizing the intermediary's bias in favor of the seller while maintaining minimally sufficient alignment with the buyer.

Key step of proof: finding a better contract

Suppose an optimal contract does not satisfy minimal IA



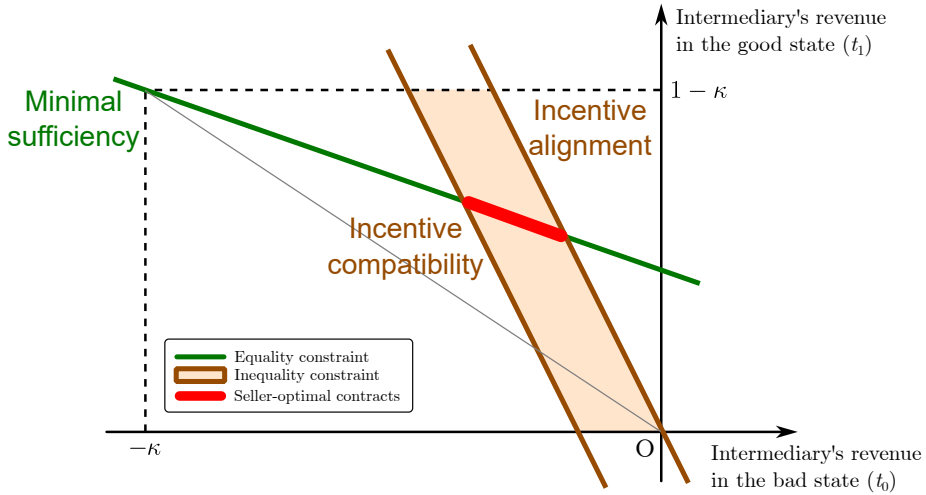
By increasing both t_0 and t_1 by a small amount,

- The blue curve shifts up
- The red curve shifts down
- Both posteriors ℓ and r moves to the left, increasing the success rate

$\Rightarrow$ This contract can't be optimal

Full characterization of seller-optimal contracts

See paper (Theorem 3) for precise statement



Implication for Return on Investment (ROI)

Seller should give the intermediary a high return relative to their risk

- Define the **return on investment (ROI)** as

$$ROI = \frac{\text{Net profit}}{\text{Cost of investment}} = \frac{\text{Earnings in the good state}}{\text{Losses in the bad state}}$$

- For example, the aggregate ROI is $\frac{1-\kappa}{\kappa}$.

Corollary

In any optimal contract, $ROI_{\text{intermediary}} > ROI_{\text{buyer}}$. In particular, in the smallest optimal contract,

$$ROI_{\text{intermediary}} = \frac{1-\ell^*}{\ell^*} > \frac{1-\kappa}{\kappa} > \frac{1-r^*}{r^*} = ROI_{\text{buyer}},$$

where $(\ell^*, r^*) \in [0, p) \times (p, 1]$ is the pair of posteriors under the contract.

Is Facebook's contract consistent with this prediction?

It depends on the investment bank's losses $(-t_0)$ in the bad state

- Facebook's net offering price was \$37.582 per share
  - The investment banks bought those shares and sold them to investors at \$38, receiving a profit of \$0.418 per share
  - Facebook's opening price was \$42 per share, giving the investors a profit of \$4 per share.
- After normalizing by the opening price, these numbers imply

$$\kappa = 0.9 \quad \text{and} \quad t_1 = 0.01.$$

- We don't have data on t_0 (investment banks' revenue in the bad state) because it is not reported in security filings and the state $\omega = 0$ was never realized.
- If $t_0 \in (-0.09, 0)$, i.e. the investment bank were to lose less than 10% of the net offering price in the bad state, this contract is consistent with the prediction

Takeaways

- People wonder why investment bankers get fat paychecks
  - Entrepreneurs already have experts like lawyers, accountants, and their own finance team. Why hire an investment bank?
- Our paper offers why
  - They're delegated talkers who make successful deals more likely
- The Sender's credibility arises endogenously
- Other applications
  - Any setting with two agents facing significant conflict of interests
  - e.g. when students (seller) apply to colleges (buyer), they rely on teachers' recommendation letters (intermediary)

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