

PE for the Public: the Rise of SPACs

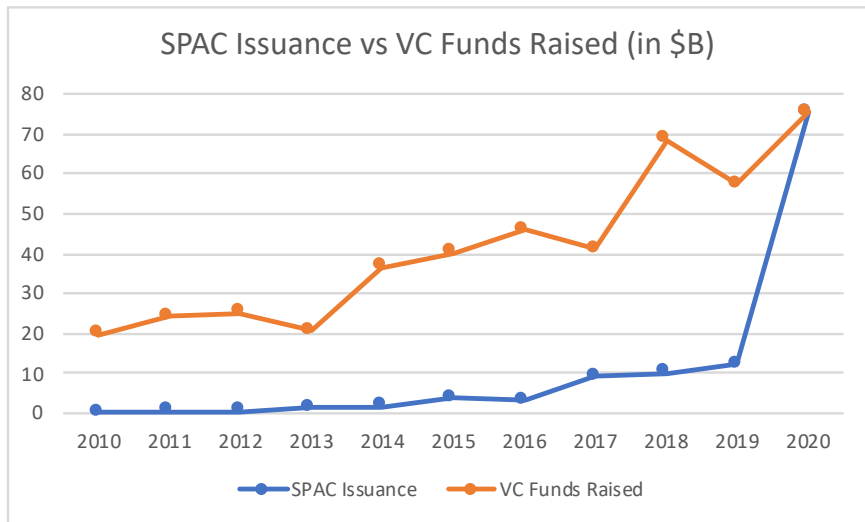
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The Remarkable Rise of the SPAC



Source: Jay Ritter's Website and the National Venture Capital Association 2021 Yearbook

SPACs as a Financing Tool for "Experts"

Traditional method for an individual or corporate entity to raise financing to deploy expertise or knowledge to purchase firms

- Raise funds from private market investors to become the GP in a PE (or VC) fund

GP eventually profits by taking firm public and selling her stake

Special Purpose Acquisition Companies

- Expert can raise (cheaper) capital directly from public markets
- Expert "sponsors" an IPO that raises cash from public markets with no firm in place
- Eventually locates a firm to acquire
- Sponsor profits by eventually selling "sponsor promotes" – essentially shares – in the equity market

Why SPACs?

Our analysis focuses on the decisions of experts to become SPAC sponsors rather than PE GPs;

- Why would such an expert raise public rather than private capital
- Why is this more likely to occur now

Our Model:

- The key difference between SPAC and PE financing is the public nature of SPAC contracts
- PE contracts are hidden from eventually public investors, creates a moral hazard problem
- SPAC contracts are public, can provide good incentives to sponsor to forego acquiring bad firms
- The dark side of SPACs: not as effective as the PE-to-IPO market at deterring low-quality sponsors from entering the market.

Relation to the Literature

Growing literature on SPACs from the perspective of the acquired firm

- Gahng, Ritter, and Zhang (2021): SPAC market equal in size to IPO market, but more costly for firms going public.
- Bai, Ma, and Zheng (2020): SPAC issuance volume driven by market sentiment.

SPACs and incentives: Klausner, Ohlrogge, and Ruan (2020).

- SPACs tend to burn cash prior to actually acquiring a firm
- Small data set showing sponsors do well and SPAC investors do not
- Inconsistent with Evidence in Gahng et. al. (2021).

Intermediary Incentives

- Holmstrom and Tirole (1997)
- Axelson, Stromberg, and Weisbach (2009)

Model Setup: Timing and Firms

Timing: three dates

- $t = 0$ Early capital raising
- $t = 1$ Firm acquisition and late capital raising
- $t = 2$ Firm cash flows realized

Firms:

- Require investment K at date $t = 1$
- Yield cash flow $x \in \{0, 1\}$ at $t = 2$
- Firm type

Good: $P(x = 1) = 1$

Bad: $P(x = 1) = p < 1$

Model Setup: Players

Investors:

- Live for one period, born on date $t = 0$ and $t = 1$
- Have deep pockets

Sponsors:

- Have capital $A < K$, must raise capital $K - A + c$ at date $t = 0$ to acquire firm at date $t = 1$
 - c is cost of setting up a fund
- Two possible types of sponsors
 - **Expert** finds a good firm with probability q and a bad firm otherwise
 - **Fly-by-night operator**: never meets a firm
- Fly-by-night operators can overwhelm the market: if they strictly prefer to enter market, c is large enough so market breaks down.

Model Setup: Preferences, Information, and Markets

Preferences:

- All agents are risk neutral, have zero outside option
- No discounting

Information:

- Expert observes her own type and firm type
- Investors do not observe expert type or firm type

Markets: Two ways for investors and expert to trade:

- **Private Markets:** contracts and payoffs only observable to the signatory parties
- **Public Markets:** contracts and payoffs publicly observable

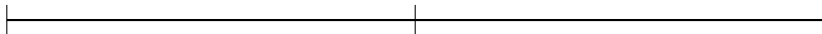
Parameter Restrictions: Bad firms are negative NPV and starting a fund that only acquires good firms is positive NPV:

$$p < K \leq 1 - \frac{c}{q}.$$

$t = 0$

$t = 1$

$t = 2$



Early Capital

The expert raises capital.

PE-to-IPO: Private investors.

SPAC: Public markets.

Acquisition and Late Capital

The expert finds a firm, G or B , and acquires it ($a = A$) or not ($a = N$).

PE-to-IPO: The acquired firm is sold to public investors in an IPO.

SPAC: The acquired firm merges with the SPAC, and is sold to public investors.

Cash flows

Cash flows realized ($x = 0$ or $x = 1$).

Securities

Investor date $t = 1$ Payoffs:

$y_1(a)$ if firm is acquired and sold to late stage investors

$y_1(n)$ if no firm is acquired

P_0 price at time $t = 0$.

Investor date $t = 2$ Payoffs:

y_2 if $x = 1$

0 otherwise

P_1 price at time $t = 1$

Expert has limited liability: investors payoff less than sum of the proceeds from the sale of new securities, the cash flow of the firm, and the remaining balance of the acquisition fund.

Expert Sponsor Payoffs

Given a set of securities y_1, y_2 and prices P_1 and a probability θ that she acquires a bad firm, expert-type sponsor has payoff

$$V(y_1, y_2, P_1; \theta) = q(P_1 - y_1(a) + 1 - y_2) + \\ (1 - q)(\theta(P_1 - y_1(a) + p(1 - y_2)) + (1 - \theta)(K - y_1(n)) - A$$

Fly-by-Night Operator Payoffs and Entry

Fly-by-night operator has payoff

$$W(y_1) = K - y_1(n) - A$$

Let ϕ the probability that the sponsor is an expert

$$\phi = \begin{cases} 1 & \text{if } W(y_1) < 0 \\ \hat{\phi} \in [0, 1] & \text{if } W(y_1) = 0 \\ 0 & \text{if } W(y_1) > 0 \end{cases}$$

Equilibrium

An equilibrium is a set of contracts (y_1, y_2) and actions θ that solve the following program

$$\max_{y_1, y_2} V(y_1, y_2, P_1; \theta),$$

such that actions are incentive compatible

$$\theta \in \arg \max_{\hat{\theta} \in [0,1]} \left[\hat{\theta}(P_1 - y_1(a) + p(1 - y_2)) + (1 - \hat{\theta})(K - y_1(n)) \right],$$

and prices are such that investors break even

$$P_0 = K - A + c = \phi((q + (1 - q)\theta)y_1(a) + (1 - q)(1 - \theta)y_1(n)) + (1 - \phi)y_1(n)$$
$$P_1 = \left(\frac{q + (1 - q)\theta p}{q + (1 - q)\theta} \right) y_2.$$

We restrict attention to renegotiation proof contracts that satisfy the Intuitive Criterion.

Renegotiation Proof Contracts

The distinction between PE and SPAC markets is the private vs public nature of contracts, imposes different renegotiation problems.

- In the PE-to-IPO market, early investors and sponsor can privately renegotiate upon locating a bad firm taking price P_1 as given:

$$\theta \in \arg \max_{\hat{\theta} \in [0,1]} \left[\hat{\theta}(P_1 + p(1 - y_2)) + (1 - \hat{\theta})K \right].$$

- In the SPAC market, early investors and sponsor can NOT privately renegotiate upon locating a bad firm, but the all three agents can

$$\theta \in \arg \max_{\hat{\theta} \in [0,1]} \left[\hat{\theta}p + (1 - \hat{\theta})K \right].$$

Adverse Selection

Key quantity in the model is the severity of adverse selection

$$\alpha = (1 - q)(1 - p).$$

- α is the difference between NPV of a good firm and the average firm
- When α is higher cost of pooling for sponsor with a good firm is higher

Equilibrium analysis

Steps to analysis:

1. The Roll of Sponsor Assets A
2. Analyze Late Stage Financing Market
3. Incentive Compatibility Constraints
4. Equilibrium in the PE-to-IPO Market
5. Equilibrium in the SPAC Market

Rich Sponsors and the First Best

Lemma

The first best obtains in either market if

$$A \geq \bar{A} = \left(\frac{p}{1-p} \right) (1-K) + c,$$

that is, no fly-by-night operators enter, and no bad firms are acquired.

- When the sponsor is wealthy, can retain sufficient skin in the game to resolve all adverse selection problems.
- Depends how likely bad firms succeed.

Restrict attention to $A < \bar{A}$.

Late Stage Financing Markets

Lemma

There does not exist a separating equilibrium in the late-stage market. Moreover, the sponsor never raises excess financing in the late-stage market under the intuitive criterion. So, $P_1 = y_1(a)$ in any equilibrium.

Intuition for no separation

- No cost of sponsor with a bad firm to emulate one with a good firm.

Intuition for no excess financing

- An expert with a good firm would always be willing to offer to retain more of the firm, and thus decrease y_2 and P_1 .
- So then if $P_1 - y_1(a) > 0$ investors must believe firm is B -type, but then $P_1 = 0$

Investors' Combined Break Even Constraint

Since $P_1 = y_1(a)$ can write

$$\underbrace{(1 - \phi)y_1(n) + \phi((q + (1 - q)\theta p)y_2 + (1 - q)(1 - \theta)y_1(n))}_{\text{Expected net payouts to investors}} = \underbrace{K + c - A}_{\text{Funds contributed by investors}} .$$

Incentive Compatibility Constraints

Expert has an incentive to forgo acquisition of bad firms if

$$p(1 - y_2) \leq K - y_1(n). \quad (\text{ICB})$$

and an incentive to acquire good firms if

$$1 - y_2 \geq K - y_1(n). \quad (\text{ICG})$$

Fly-by-night operator has incentive to stay out of the market if

$$K - y_1(n) \leq A. \quad (\text{ICFly})$$

Equilibrium in the PE Market: Acquisition

Conjecture the Fly-by-Night Operators never enter the market and suppose there is an equilibrium in the PE market such that no bad firms are acquired $\theta = 0$, then combined break-even constraint is

$$qy_2 + (1 - q)y_1(n) = K + c - A$$

(ICB) is

$$p(1 - y_2) \leq K - y_1(n),$$

and the renegotiation constraint is

$$y_2 + p(1 - y_2) \leq K$$

Together this constraints imply $A \geq \bar{A}$.

$\Rightarrow$ If $A < \bar{A}$, then $\theta > 0$, and some bad firms acquired.

Intuition

Suppose sponsor and early investors anticipate favorable pricing in the IPO market

- Can always collude to pass a bad firm onto later stage (IPO) investors
- Since contracts, i.e. y_1 , are not publicly observable, IPO market investors must anticipate that this can happen
- In equilibrium contracts are designed ex ante anticipating this conflict, and no renegotiation occurs
- Only way to prevent this is for sponsor to have more skin-in-the game high A

Fly-by-night Operators in the PE Market

For $A \leq \bar{A}$, expert acquires some bad firm $\theta > 0$, If $0 < \theta < 1$ Investors' break-even constraint, early investors/sponsor renegotiation constraint, and (ICB) pin down $y_1(n)$:

- Reward for turning down a bad firm $K - y_1(n)$ must exactly enough to make the sponsor and the early investor/sponsor coalition indifferent between acquiring a pad firm and not

$$\begin{aligned} K - y_1(n) &= p(1 - y_2) \\ K &= P_1 + p(1 - y_2) \end{aligned} \Rightarrow P_1 = y_1(n) = K - p(1 - y_2)$$

- Payoff for investors in the event of success y_2 must be large enough to get investors to break even

$$(q + (1 - q)\theta)(K - p(1 - y_2)) + (1 - q)(1 - \theta)(K - p(1 - y_2)) = K - c - A$$

$\Rightarrow y_1(n)$ set to make investors whole if no firm is acquired.

$$y_1(n) = K + c - A$$

But then

$$K - y_1(n) = A - c < A$$

and Fly-by-Night Operators stay out of the market. Argument for $\theta = 0$ is similar.

Equilibrium in the PE-to-IPO market

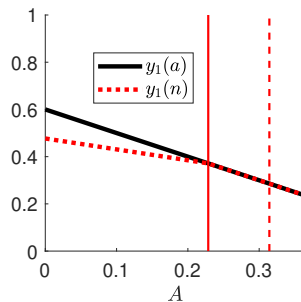
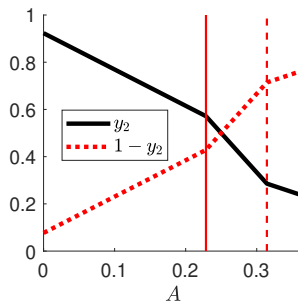
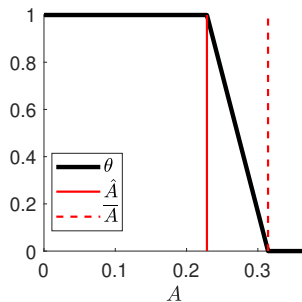
Proposition

Assuming the expert sponsor participates, the unique equilibrium acquisition strategy for the expert sponsor in the private equity market is given by

$$\theta = \begin{cases} 1 & \text{for } A \leq \hat{A} \\ \left(\frac{1}{K-p}\right) \left(\frac{q}{1-q}\right) \left(1 - K - \left(\frac{1-p}{p}\right) (A - c)\right) & \text{for } \hat{A} < A \leq \bar{A} \end{cases}$$

For $\hat{A} < \bar{A}$. Fly-by-night operators never enter the private equity market, in that $\phi = 0$.

Equilibrium in the PE-to-IPO Market



The optimal contract under PE-to-IPO financing as a function of expert net worth A . The vertical solid red line depicts $\hat{A}$ and the vertical dashed red line depicts $\bar{A}$. The parameters are $p = 0.3$, $c = 0.1$, $K = 0.5$, and $q = 0.5$.

Acquisition in the SPAC Market and Renegotiation proofness

Recall, the renegotiation proofness condition in the SPAC market

$$\theta \in \arg \max_{\hat{\theta} \in [0,1]} [\hat{\theta}p + (1 - \hat{\theta})K].$$

- Any two party renegotiation is observed and priced by the third party, sufficient to consider the largest possible coalition.
- θ must maximize social surplus
- Since $p < K$, no bad firms acquired, $\theta = 0$

Fly-by-Night Operator's in the SPAC Market

No bad firms acquired requires (ICB)

$$K - y_1(n) \geq p(1 - y_2)$$

Now suppose there exists an equilibrium in the SPAC market so that FBNO do not enter, requires (ICFly)

$$K - y_1(n) \leq A$$

And early investor break even constraint is

$$K - A + c = qy_2 + (1 - q)y_1(n)$$

which together imply

$$A \geq \tilde{A} = \frac{p(1 - K - \frac{c}{q})}{1 - p}$$

$\Rightarrow$ When $A < \tilde{A}$ Fly-by-Night Operators enter the market. The same incentives that prevent experts from acquiring bad firms incentivize Fly-by-Night Operators to enter.

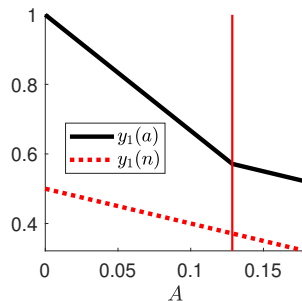
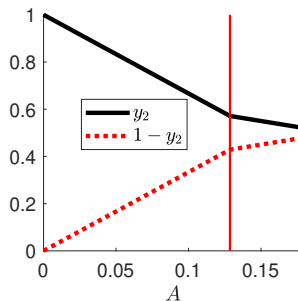
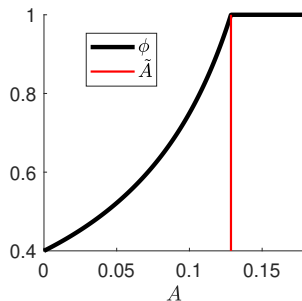
Equilibrium in the SPAC Market

Proposition

Assuming the expert sponsor participates, the equilibrium in the SPAC market calls for the expert sponsor to reject all bad firms, that is, $\theta = 0$. Moreover, the equilibrium is given by the first best allocation when $A > \tilde{A}$ in which case no fly-by-night operators enter and $\phi = 1$. When $A < \tilde{A}$, Fly-by-night operators enter the market such that investors meet an expert sponsor with probability

$$\phi = \frac{cp}{q(p(1 - K) - A(1 - p))}.$$

Equilibrium in the SPAC Market



The optimal contract under SPAC financing as a function of expert net worth A . The vertical solid red line depicts $\tilde{A}$. The parameters are $p = 0.3$, $c = 0.1$, $K = 0.5$, and $q = 0.5$.

Expert Participation in the PE-to-IPO Market

The experts net payoff from entry is

$$V^{PE} = \begin{cases} 1 - \alpha - (K + c) & \text{for } A \leq \hat{A} \\ \left(\frac{1-p}{p}\right) qA - \left(\frac{1-\alpha}{p}\right) c & \text{for } \hat{A} \leq A \leq \bar{A} \\ q(1 - K) - c & \text{for } A \geq \bar{A}. \end{cases}$$

If $K + c > 1 - \alpha$ and

$$A \leq \underline{A} = \left(\frac{1 - \alpha}{(1 - p)q} \right) c.$$

then $V^{PE} < 0$ and the expert will not enter and the market will fail

Expert Participation in the SPAC Market

the expert sponsor payoffs in the SPAC market are given by

$$V^{SPAC} = \begin{cases} \left(\frac{1-p}{p}\right) qA & \text{for } A \leq \tilde{A} \\ q(1-K) - c & \text{for } A \geq \tilde{A} \end{cases}$$

Note that $V^{SPAC} > 0$ for all A and α .

Under-investment and Over-investment

The PE-to-IPO Market

- When the adverse selection problem is severe or the sponsor has little assets, good firms will not be acquired because of market breakdown $\Rightarrow$ under-investment in good firms
- When the sponsor has more assets, she will occasionally acquire bad firms $\Rightarrow$ over-investment in bad firms

The SPAC Market

- When the sponsor has little assets, Fly-by-Night Operators are more likely to enter $\Rightarrow$ over-investment in fundraising
- Market never breaks down, so good firms that cannot get acquired in the PE-to-IPO market can get acquired in the SPAC market

Increase in intangibles may have increased adverse selection problems and can help explain the decline of traditional IPOs

The Sponsors Choice of Markets

Proposition

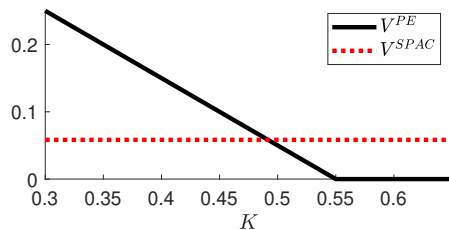
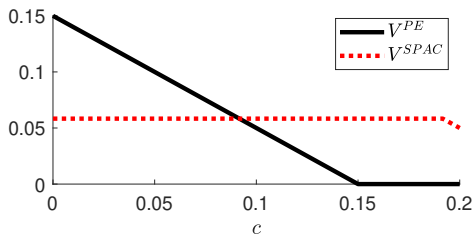
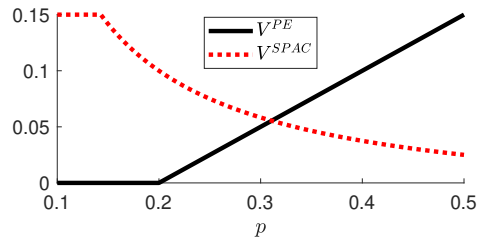
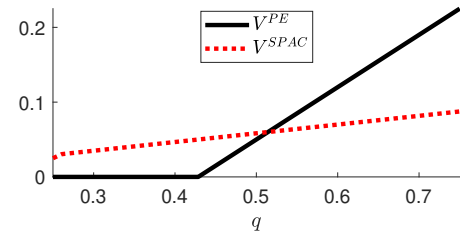
Suppose $A < \bar{A}$

- 1. If the NPV of the average firm is positive, $1 - \alpha \geq K + c$, then the sponsor prefers PE-to-IPO financing if $A < A_c$ and SPAC financing otherwise.*
- 2. If the NPV of the average firm is negative, $1 - \alpha \leq K + c$, then the sponsor prefers a SPAC financing for all A .*

Where

$$A_c = \frac{p(1 - \alpha - K - c)}{(1 - p)q},$$

The Sponsors Choice of Markets



The expert's choice between the PE-to-IPO and SPAC model. The parameters are $A = 0.05$, $p = 0.3$, $c = 0.1$, $K = 0.5$, and $q = 0.5$.

Sponsor Promotes in the SPAC Market

A common form of compensation for sponsor of a SPAC are so-called "sponsor promotes"

- Sponsor invests a very small amount at IPO, typically \$25K
- In exchange sponsor receives shares in the SPAC with value in excess of her investment, called promotes.
- Contrasts with PE funds where carried interest is relatively less valuable at inception.

Our model offers an explanation

- SPACS offer good incentives in acquisition markets with severe adverse selection over targets.
- Can sustain markets with very low A , when the PE market might fail.
- Sponsor still captures most of the surplus, gets it in the form of sponsor promotes.

The Firms Choice

So far K has been exogenous. Now suppose that K is determined by Nash bargaining between the investors/sponsor and the firm.

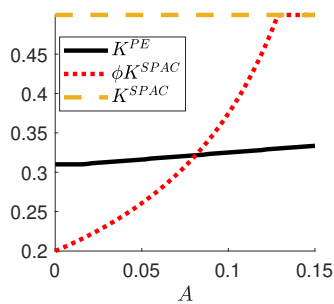
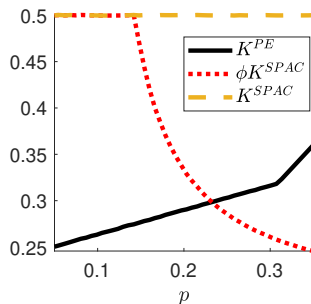
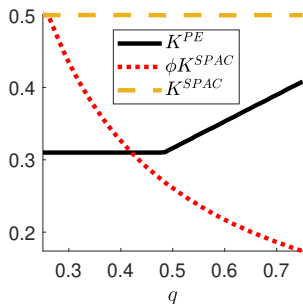
Acquisition price in the PE-to-IPO market is

$$K^{PE} = \arg \max_{K \geq \underline{K}} \left[K^\eta (1 + c - A - y_2^{PE})^{1-\eta} \right],$$

Acquisition price in the SPAC market is

$$K^{SPAC} = \arg \max_{K \geq \underline{K}} \left[K^\eta (1 - K)^{1-\eta} \right],$$

The Firms Choice



The firm's choice between the PE-to-IPO and SPAC model. The parameters are $A = 0.05$, $p = 0.3$, $c = 0.1$, $\underline{K} = 0.32$, $\eta = 0.5$, and $q = 0.5$.

Optimal Fund Size

The optimal scale of SPAC fund size is 1 firm:

- Sponsor co-investment mitigates sponsor adverse selection (even for small A).
- Sponsor would like to maximize co-investment per firm.

The optimal scale of a PE fund is larger when adverse selection is mild

- When A is small, sponsor acquires good and bad firms, marginal increase in A doesn't affect acquisition
- Sponsor want to scale up to increase profits.

Conclusion

A model of SPAC vs PE financing for expert investors:

- An essential difference between SPACs and PE is the public nature of SPAC financing.
- Because SPAC contracts are public, they allow experts to fully internalize the benefits of providing incentives to forgo the acquisition of bad firms.
- These incentives in turn make it hard to keep low-quality sponsors out of the market.
- In contrast, the PE markets keeps early stage financing private.
- This in turn makes it hard to provide incentives to forgo the acquisition of bad firms.