The Incentives of SPAC Sponsors*

Felix Feng† Tom Nohel‡ Xuan Tian§
Wenyu Wang¶ Yufeng Wu‖

April, 2025

Abstract

Special Purpose Acquisition Companies (SPACs) took Wall Street by storm in 2020/2021 and continue to play a significant role in today's capital markets. Estimating a structural model using a hand-collected comprehensive dataset, we find that SPACs add value by identifying and bringing high-potential firms to public markets, though contractual frictions skew the distribution of spoils away from SPAC shareholders and towards sponsors and target owners. Nonetheless, shareholder excess returns are positive once redemptions are accounted for. Policy analyses reveal that earnout provisions enhance welfare, while modest improvement in disclosure and limits on warrant usage have minimal impact on improving outcomes.

JEL Classification: G20, G23, G34, D82
Key Words: SPAC, Agency Cost, Information Friction, Structural Estimation

---

*We would like to thank Meng-Wei Hao, Zhengming Li, Tong Yu, Kelly Zhang, and Wang Zhang for invaluable research assistance. We thank Gritstone Asset Management, and particularly Nicholas Skibo, for providing us with Gritstone's SPAC redemption data. We also thank Francesco Castellaneta, Doug Ellenoff, Michael Gofman, Barney Hartman-Glaser, Jay Ritter, Nick Skibo, Chris Yung, seminar participants at Cheung Kong Graduate School of Business, Dartmouth College, Hong Kong University of Science and Technology (HKUST), Imperial College London, Indiana University, Iowa State University, Peking University, University of Iowa, University of Kansas, University of Notre Dame, University of Washington, Swiss Finance Institute, EPFL, and Tsinghua PBC, and conference participants at the AES webinar, American Finance Association meeting (AFA), Australasian Finance and Banking Conference (AFBC), China International Conference in Finance (CICF), 39th Annual Conference of the French Finance Association, Entrepreneurial Finance (ENTFIN) Association Annual Conference, FFEA New Frontiers in Banking and Capital Markets Conference, Financial Management & Accounting Research Conference, 2022 FMARC Conference, 7th Annual MA Research Conference, Midwest Finance Association meeting (MFA), Northeastern University Finance Conference, Owners and Strategists Conference, Paris Financial Management Conference, 10th Annual SEC Conference on Financial Market Regulation, SPAC European Conference, and the Tenth Annual Conference on Financial Market Regulation for helpful comments. All remaining errors are the responsibility of the authors. Wenyu Wang acknowledges the financial support provided by the Peterson Chair in Investment Banking.

†Michael G. Foster School of Business, University of Washington. Email: ffeng@uw.edu
‡Quinlan School of Business, Loyola University – Chicago. Email: tnohel@luc.edu
§PBC School of Finance, Tsinghua University. Email: tianx@pbcsf.tsinghua.edu.cn
¶Kelley School of Business, Indiana University. Email: wenywang@iu.edu
‖Fisher College of Business, Ohio State University. Email: wu.6251@osu.edu

1 Introduction

Special Purpose Acquisition Companies (SPACs) exploded in popularity in 2020 and 2021. Heralded as the "hottest thing in finance" (*Wall Street Journal*, Jan 23rd, 2021), SPAC IPOs accounted for more than 60% of all IPO activity in 2021, with 613 SPAC IPOs in the U.S. raising close to $220 billion of new capital. But, like the market for traditional IPOs, the SPAC market cooled significantly in 2022 as equity markets sold off broadly and many investors incurred steep losses. Yet, SPACs remain active despite the downturn: in 2022 and 2023, more than one third of IPOs were SPACs. Moreover, in a more apt comparison, completed SPAC business combinations (so called de-SPACs) were nearly as common as traditional IPOs as a means of going public in 2022 and 2023. Specifically, of the 414 private companies that went public in 2022 and 2023, 210 used a traditional fixed-price IPO, and 200 went public via a SPAC, underscoring SPACs' ongoing relevance in capital markets. The SPAC market, though no longer in a frenzy, appears to be evolving toward a long-run steady state with a significant presence.

But looking beyond the fanfare, SPACs confront significant challenges, particularly from regulators calling for improved disclosures and shareholder lawsuits intent on reining in self-serving sponsors, who are granted large blocks of stock known as the sponsor "promote". These challenges are encapsulated by a recent case involving Churchill Capital III and its intended target, Multiplan, where sponsors were able to benefit at the expense of non-redeeming shareholders.[1]

In contrast to these challenges, SPACs also present unique opportunities, particularly as a pathway to expand access to public markets. SPAC sponsors serve as intermediaries, connecting investors to private firms with potentially innovative technology or business. By facilitating firms' access to capital, SPACs have the potential to improve capital allocation efficiency and generate social value, especially when firms struggle to secure funding through conventional channels.

In this paper, we construct and estimate a structural model to explore the dual na-

[1]Specifically, Churchill III (CCXX) proposed to acquire Multiplan (MPLN), a leading healthcare payment processor, in a deal that was approved by CCXX shareholders with minimal redemptions. But shortly after the deal closed, news emerged that MPLN was facing a substantial loss of revenue due to an in-house substitute being developed by its largest client, UnitedHealth. MPLN's shares plummeted, and CCXX shareholders incurred significant losses, while CCXX's sponsor, Michael Klein, who was accused of suppressing the salient news, still reaped considerable gains on his promote shares.

ture of SPACs, addressing both their challenges and opportunities. Our model focuses on the rich strategic interactions among the SPAC sponsor, the target company, and SPAC shareholders, surrounding a proposed business combination (i.e., the de-SPAC transaction). The SPAC sponsor identifies a target company and offers to enhance its value via cash, a public listing, and possibly industry/management expertise. The surplus created is then split via bargaining, with the sponsor and target negotiating deal terms that specify the sponsor's compensation, the offer to the target, and any additional capital to be raised. This negotiation is influenced by two forces: agency costs and the anticipated deal completion rate. Sponsors benefit from their compensation and also internalize shareholders' gains or losses to varying degrees. The (unobservable) extent to which the sponsors internalize SPAC shareholder outcomes captures the potential misalignment of interests, thereby proxying for agency costs. Better aligned sponsors (i.e., those with low agency costs) will advocate for more shareholder-friendly terms. Both sponsors and targets must also consider how their negotiated terms will affect the likelihood of deal completion, which in turn depends on the redemption rate chosen by SPAC shareholders. Sponsors and targets face a trade-off: pushing for more favorable terms for themselves brings immediate gains at a heightened risk of deal failure due to elevated redemption levels, while more shareholder-friendly terms can mitigate this risk.

Lesser-informed SPAC shareholders must infer their expected returns based on public and private signals. The public signals include proposed deal terms and sponsor reputation. Shareholders decide whether to redeem their shares at face value or retain ownership beyond the de-SPAC. High redemption rates deplete the SPAC of cash, jeopardizing deal completion.

Our model features an equilibrium where decisions are jointly determined and rationally anticipated by all parties. When the sponsor and target negotiate deal terms, they account for anticipated redemptions from shareholders, who face information asymmetry. Similarly, shareholders base their redemption decisions on the deal terms they observe, which are strategically optimized by the sponsor with potentially misaligned incentives. As a result, the sponsor's agency costs and shareholders' information frictions play crucial roles in shaping how value is created and distributed in de-SPAC transactions. This equilibrium framework enables us to explore counterfactual scenarios where changes in these key frictions alter the interaction between deal terms design and shareholder inference, which, in turn, collectively influence the total value created in this market and how that value is shared among players.

To gauge the quantitative implications, we bring the model to the data through a structural estimation. We assemble a comprehensive dataset of US-listed SPACs and their deal characteristics for SPACs that completed acquisitions between 2010 and March of 2022. A feature of our data that differentiates our work from previous studies is that it contains detailed terms regarding sponsor compensation (forfeited promote shares, private placement warrants, and sponsor earnouts), external financing brought in by the sponsors (e.g., forward purchase agreements (FPAs), private investments in public equity (PIPEs), etc), shares and cash offered to the target shareholders, and the aggregate redemptions of SPAC shareholders. Though most previous studies focus on SPAC returns, our data allow us to answer questions related to agency costs and information frictions embedded in SPAC contracts. To our knowledge, our paper is the first to construct and estimate a viable model of SPACs with these frictions.

In the model, as in the data, redemptions are negatively correlated with ex-post deal performance, suggesting that SPAC shareholders can partly infer deal quality based on the public and private information they observe. The estimated model reflects their inference: sponsors' forfeit of promote shares portends low shareholder returns; external capital raised certifies deal quality; and generous offers made to targets warn of potential over-payment. Sponsor reputation strongly correlates with deal quality but only weakly associates with agency costs. We estimate the model by searching for the set of parameters that allow the model to most closely match these crucial moments in the data. The estimated model fits the data closely.

Our estimates yield several novel findings that call into question prevailing notions about the SPAC market. First, we find that SPACs, on average, create significant value for the economy by effectively screening and bringing high-potential targets to public markets. This value creation is substantial, amounting to approximately 24% of the targets' standalone value on average, in contrast to the popular belief that SPACs primarily benefit sponsors and targets by transferring wealth from uninformed investors while generating little intrinsic value. Moreover, in the backdrop of recent studies (e.g., Gryglewicz et al., 2022 and Bai et al., 2021) arguing that SPAC targets often have limited options for going public via traditional IPOs and likely face capital constraints if they remain private, our finding suggests that the SPAC process adds substantial value by facilitating access to public markets, generating value that would otherwise remain untapped. By enlarging the set of firms that can access public markets, as well as expanding the menu of choices of how firms gain a public listing, SPACs play a critical role in enhancing capital allocation efficiency and fostering growth in firms that may not have been able to go public through traditional means or find it excessively costly to do so.

Second, our analysis suggests a more balanced view of shareholder returns. While non-redeeming shareholders have experienced average losses of 9%, the overall picture changes when factoring in redemptions and the returns to redeeming shareholders. We calculate that the average gains across SPACs stand at 2.4% when including both redeeming and non-redeeming shareholders. This discrepancy is driven by the redemption option, which allows shareholders to exit before the business combination if they sense a poor deal is in the offing. We find that in deals that are less attractive ex-post, more shareholders redeem, leaving only a small number invested who incur the ensuing losses, greatly diminishing value destruction. Conversely, in more promising deals, a larger number of shareholders remain invested, potentially earning substantial returns. This pattern underscores why focusing solely on non-redeeming shareholder returns can be misleading when assessing overall shareholder welfare.

Our findings provide a more comprehensive understanding of the SPAC market's impact and efficiency, challenging the notion that SPACs destroy value on a massive scale. Instead, they offer a more nuanced view of SPACs as a mechanism for value creation, albeit with room for improvement in terms of value distribution. To further explore potential improvements to the SPAC structure, we use the estimated model as a laboratory to conduct policy experiments designed to evaluate the efficacy of measures proposed by the SEC and others to improve outcomes among SPAC participants.

We examine three proposed policies. The first is to tie sponsor promote shares to performance, known as earnouts, where shares subject to earnout provisions are canceled if the post-de-SPAC stock price fails to reach a predetermined trigger price. Proponents argue that such performance-based compensation better aligns the interests of sponsors and shareholders.[2] The second policy experiment involves limiting the number of warrants issued in SPAC IPOs. Warrants are dilutive, since their exercise results in the issuance of new shares. Advocates claim that limiting warrants helps mitigate dilution of the combined firm's value, thereby improving returns for non-redeeming shareholders. The third policy focuses on increasing disclosure in deal prospectuses, with the aim of reducing information asymmetry among shareholders, sponsors, and targets.

We conduct these policy experiments by constructing counterfactual economies using the estimated model. In these economies, we alter the fraction of the sponsor's promote that is tied to earnouts, limit warrant issuance, and increase the precision of shareholders' private signals by differing amounts. We show that tying the sponsor's promote to performance via earnouts significantly improves shareholder returns. For every 10% increase in the fraction of sponsor promote tied to earnouts, non-redeeming shareholder returns increase by 1.8 percentage points. This improvement stems from both increased value creation and a reduced stake allocated to sponsors, curbing conflicts of interest between SPAC sponsors and shareholders. In contrast, cutting back warrants has limited impact on shareholder welfare: a 10% reduction in warrants issued increases non-redeeming shareholder returns by only 0.3 percentage points. Moreover, curtailing warrant usage does little to mitigate agency costs, since warrant dilution is primarily a concern when post-de-SPAC performance is strong, which is less likely when agency costs are high. Lastly, we find that increasing disclosure isn't very effective unless the precision of shareholders' private signals increases to an unrealistic extent.

Our paper contributes to the growing body of research on SPACs. While early studies on this topic were typically constrained by sample size,[3] the recent surge in SPAC activity has inspired new work such as Blomkvist and Vulanovic (2020); Lin et al. (2021); Klausner et al. (2022); Dambra et al. (2023); Gahng et al. (2023). These studies examine the determinants and subsequent performance of SPACs using more comprehensive samples. Our findings bring a new perspective to this literature by highlighting the need to look beyond the fortunes of non-redeeming shareholders. Moreover, our results provide empir-

[2]For example, "London SPACs - the Opportunity", https://www.winston.com/en/thought-leadership/london-spacs-the-opportunity.html.

[3]See e.g., Lewellen (2009), Jenkinson and Sousa (2011), Cumming et al. (2014), Rodrigues and Stegemoller (2014) Chatterjee et al. (2016), Kolb and Tykvova (2016), and Dimitrova (2017).

ical support for recent theoretical studies that highlight potential benefits of SPACs. For instance, our findings align with Gryglewicz, Hartman-Glaser, and Mayer (2022), who argue that SPACs serve as an efficient mechanism for separating good acquisitions from bad, and Bai et al. (2021), who posit that SPAC sponsors act as intermediaries matching yield-seeking investors with riskier, high-growth firms. Meanwhile, on the theory front, recent studies explore specific features that lead to the rise of SPACs (Alti and Cohn, 2022; Gryglewicz et al., 2022) and their implications for investors' returns (Banerjee and Szydlowski, 2024; Luo and Sun, 2022; Gofman and Yao, 2022). We contribute to this burgeoning literature by quantifying the value creation in SPACs and the magnitude of contractual frictions embedded in SPAC structures through the lens of a structural model. Using the model, we also perform counterfactuals to evaluate the efficacy of proposed regulatory changes intended to improve the SPAC mechanism.

Our paper is also related to the literature that estimates the impact of information friction and agency conflicts in the capital market. Albuquerque and Schroth (2010) quantify the private benefits of control in block trades, uncovering sizeable control benefits and significant value creation by controlling shareholders. Albuquerque and Schroth (2015) find that these controlling shareholders also suffer from a substantial illiquidity-spillover discount. Kang and Lowery (2014) estimate managers' preference for taking their companies public, and show that such preference, combined with the underwriters' collusive behavior encourages large and persistent underpricing in the IPO market. Focusing on corporate takeovers, Celik et al. (2022) document sizable information frictions between acquiring and target firms, that can reduce the capitalized gain in this market by 60%; Wang and Wu (2020) find that managerial control benefits in takeovers can generate both positive and negative effects on firms. Our paper contributes to this literature by focusing on the SPAC market. This market is unique in its structure and differs much from the traditional takeover market in that the structure of the sponsor's compensation aggravates the agency conflict. Our paper provides a quantitative assessment of these frictions and proposes potential remedies, while also highlighting the benefits of SPACs in expanding access to public markets for certain types of firms and potentially providing attractive alternatives for others.

2 An Overview of the SPAC Structure

SPACs, or blank check companies, are formed as shells without formal operations. They list their shares in an underwritten IPO for the sole purpose of raising cash and acquiring a private company who takes over the SPAC's listing, thereby gaining a public listing for *its* shares.

A unique feature of SPACs is that they place all IPO proceeds in a trust that sponsors cannot touch until the SPAC successfully completes an acquisition or decides to liquidate. SPACs have a limited timeframe to get a deal done, including shareholder approval. The responsibility of finding an acceptable target is delegated to the SPAC sponsor, who in turn receives a sizeable equity stake as compensation. Most importantly, when shareholders vote on a proposed business combination, they retain the right to redeem their shares for roughly the IPO price or slightly higher. A SPAC that fails to complete a deal on time will liquidate, with SPAC shareholders receiving their pro-rata share of the trust and sponsors getting nothing.

Following the SPAC IPO, the sponsor initiates negotiations with numerous prospective targets about a possible deal.[4] If there is sufficient interest from both sides, the sponsor signs a non-disclosure agreement (NDA) and enters into formal negotiations with the prospective target. Here begins the due-diligence phase, wherein the sponsor is granted access to reams of private information in the hope of coming up with a valuation that is high enough for the target owner to accept, and yet low enough to discourage shareholders from redeeming their shares.

Finally, the SPAC sponsor must convince the SPAC shareholders to approve the deal. While shareholder approval is usually a formality, the linchpin of the process is investors stay-or-redeem decision, since shareholders can approve the deal but still redeem their shares. Upon approval, the target firm takes over the SPAC's listing in what is known as the de-SPAC. It is clear that SPAC sponsors are the critical cog in the entire SPAC process, serving in a role somewhat akin to an IPO underwriter, but with a sizeable stake in the newly public firm. However, while the SPAC mechanism has the potential to be

[4] Appendix C provides substantial detail on this search process for two SPACs in our sample, showcasing the level of care and scrutiny exhibited by many SPAC sponsors. This information is directly revealed by the sponsor(s) in a proxy (DEFM14a) filed in advance of the business combination.

more efficient than a fixed price IPO, the incentives of SPAC sponsors and shareholders are not well-aligned to the downside, creating the potential for costly agency problems.

In light of these potential conflicts, sponsors may seek to mollify investors in an attempt to curtail redemptions. To this end, there are various actions the sponsor can take that can make a proposed deal more attractive to shareholders. First, the sponsor can raise additional capital for the business combination via a PIPE, making a proposed deal more attractive to target owners by bringing more cash to the deal. The participation of sophisticated PIPE investors may serve to reassure SPAC shareholders of a proposed deal's validity, making them less inclined to redeem their shares. Of course, PIPEs also have costs, and PIPE investors get to share in the spoils should things go well.

Second, the sponsors can reduce their own compensation. Recall that sponsors' main source of compensation is their promote stake. SPACs typically set the promote stake at 25% of IPO shares, implying that the sponsor will own 20% of public shares at the time of the de-SPAC (assuming no redemptions). It is possible that the sponsor will willingly forfeit part of his promote stake during negotiations. Since the cost of the promote is borne by all *other* shareholders, the sponsor's willingness to forfeit any of it is beneficial to all other shareholders. Additionally, the sponsor may offer to tie some of his promote to performance via an "earnout". One can view an earnout as analogous to forfeiting a significant fraction of his promote stake in ex-post bad deals.

Finally, the sponsor must negotiate a valuation with the target owners. The SPAC then offers the target owners consideration entirely or largely in the form of newly-issued SPAC shares, where more shares given to the target mean smaller stakes for everyone else.

Ultimately, the sponsor presents a proposed acquisition to the SPAC shareholders, including details that may incorporate many or all of the above actions taken by the sponsors. SPAC shareholders then decide whether to redeem their shares for cash or retain their stake in the ongoing (de-SPACed) enterprise, knowing that the sponsors interests are unlikely to be perfectly aligned with their own, and that there may be severe financial consequences for wrong decisions. Our model of the SPAC mechanism is intended to capture all these features.

3 Model

The model focuses on the de-SPAC stage, and it solves for the optimal deal terms chosen by the sponsor and target as well as the redemption decision made by the SPAC shareholders, highlighting the key frictions embedded in this process and the important interactions of the decision-making process of different parties.

Throughout this section, the number of units issued in the SPAC IPO is normalized to one. We also normalize the proceeds raised in the SPAC IPO to 1, which implies the numeraire is 10 dollars. Each SPAC unit contains one common share and a fraction, w, of warrants. w varies across SPACs, with common values being 0, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{3}{4}$, or 1. We take w as given for each deal. In other words, we abstract away from any decisions in the SPAC IPO process, and take things such as the size of the IPO and the composition of each unit as given. These decisions are made long before the SPAC sponsor meets a target and are thus less relevant for our objective of interest.[5] Instead, we focus on the decisions during the de-SPAC process after the sponsor has found a target.

3.1 Value and ownership of the combined firm

In a proposed de-SPAC, the value of the combined firm is mainly determined by the amount of cash the SPAC brings to the deal and the value of the target post-merger. The cash brought in by the SPAC includes the amount of cash contributed by non-redeeming SPAC shareholders and the amount of cash raised externally through PIPE and/or FPA. Let δ denote the fraction of SPAC shares redeemed, and thus $1 - \delta$ dollars, contributed by the non-redeeming shares, are retained in the SPAC. Also denote the cash raised externally by K. Then the total cash that the SPAC brings to the deal is:

$$C = 1 - \delta + K, \tag{1}$$

We denote the value of the target firm, as a standalone, private entity, by u, and we assume that its value becomes $(1 + z) \cdot u$ if it merges with the SPAC. z therefore can be viewed as the return created by merging with the SPAC. For instance, z can represent the gains from publicly listing the target firm or any value created by SPAC sponsors

[5] For a detailed analysis of structuring SPAC units in the IPO process, see Bessler and Nohel (2025).

for the combined firm (e.g., sponsor's network, advice, etc.). z may also be negative for some deals if, for example, a target is taken public prematurely or the combined firms' managers engage in over-investment. In addition, for SPACs that issue warrants in their IPOs, these warrants will be exercised if the post-merger stock price is above the strike price of the warrants, which is typically set at 11.5 dollars in the data (and thus 1.15 dollars in the model). When exercising, warrant holders pay $1.15 \cdot w$ dollars to the combined firm in exchange for w shares of ownership.

Adding up these components, we can write the value of the combined firm as:

$$V = C + (1+z)u + 1.15 \cdot w \cdot \mathbf{1}_{\{p>1.15\}} - F, \tag{2}$$

where $\mathbf{1}_{\{p>1.15\}}$ is an indicator that equals one if the post-merger share price is above the strike and zero otherwise, and F is the total fee paid, including the underwriting fee and other fees.[6]

The combined firm value is distributed among different participants in the model, proportional to their ownership in the merged entity post de-SPAC. The non-redeeming SPAC shareholders own $1-\delta$ shares. The external financiers (e.g., PIPE/FPA investors), who purchase the SPAC shares at the IPO price, own K shares.

A unique feature of SPACs is that, upon formation, SPACs create additional shares, in an amount equal to 25% of the IPO shares, and award them to sponsors. These shares are known as the sponsor's "promote". Therefore, within our model, sponsors own 0.25 shares that they are effectively endowed with. As we will model formally below, the sponsors may sometimes have an incentive to forfeit part of their promote stake, in order to retain shareholders, and thus we denote the sponsors' final ownership in the combined firm as $\theta \in [0, 0.25]$, which is endogenously determined by the sponsors in our model.

Finally, we assume that the target shareholders are offered n shares in the combined firm, compensating them for the value they bring to the deal. The warrant holders, if exercising, will own w shares after contributing $1.15w$ in cash.

[6]Note that underwriting fees are usually structured as a fixed upfront fee (typically 2%), and a fee contingent on successful de-SPAC (typically 3.5%). Since we model the post-merger firm value, the total underwriting fee should be 5.5%. F also includes other fees. Usually, the 2% upfront fee is financed by the sponsor's purchase of warrants and/or units, known as the sponsor's risk capital. This should be deducted from F.

The total number of shares in the combined firm post de-SPAC thus equals:

$$N = 1 - \delta + K + n + \theta + w \cdot \mathbf{1}_{\{p>1.15\}}, \tag{3}$$

Given the post de-SPAC firm value, V, and total shares outstanding, N, the post de-SPAC share price is:

$$p = \frac{V}{N}, \tag{4}$$

Since shareholders are entitled to redeem their shares at a nominal price, which is normalized to 1 in the model, the return to non-redeeming shareholders who see through the business combination is:

$$R_{sh} = p - 1, \tag{5}$$

which we also refer to as the de-SPAC return and use it interchangeably with the return to non-redeeming shareholders henceforth.

The above accounting identity illustrates the potential sources of dilution to the non-redeeming shareholders' ownership in the combined firm. Clearly, the sponsor's promote shares θ add to the denominator but not to the numerator, and thus dilute firm value. If exercised, warrants are necessarily dilutive, since exercise implies that the warrants are in-the-money, and warrantholders are purchasing shares worth p, for a strike price which is strictly less than p.

3.2 Decision-makers

As shown above, the SPAC market involves various participants interacting with each other. To remain focused, we divide them into peripheral players (with simplified decision rules) and key decision makers. The peripheral players include the external financiers and warrant holders. The external financiers supply a level of capital, K, as demanded by SPAC sponsors, resulting in a quadratic financing cost that we specify in Equation 8 below. The warrant holders follow an optimal exercise rule, exercising the warrants if and only if they're in-the-money following the de-SPAC.

The key decision makers include the sponsor, the target, and the SPAC shareholders. The sponsor and the target negotiate the *deal terms* $(\theta, K, \frac{n}{N})$, which consist of the sponsor's compensation θ, the capital raised externally K, and the offer made to target shareholders n, expressed as a fraction of the target's ownership in the combined firm, $\frac{n}{N}$. The payoff to the target is $n \cdot p$ if the deal completes and u if the deal breaks down. As a result, the target's gain from a completed de-SPAC is:

$$U_{tar} = n \cdot p - u, \tag{6}$$

The sponsor receives θ promote shares, worth $\theta \cdot p$, as his compensation if the merger consummates. Since the sponsor is delegated the responsibility of finding a good deal for shareholders, he internalizes, to some extent, the gains/losses of the shareholders. Meanwhile, if the sponsor raises external capital from a PIPE and/or FPA, he may also internalize the gains/losses of those external financiers. We thus specify the sponsor's gains from a completed de-SPAC as:

$$U_{sp} = \theta \cdot p + (1 - \ell) \cdot (1 - \delta) \cdot (p - 1) + (1 - \xi) \cdot K \cdot (p - 1) - \phi, \tag{7}$$

where ϕ represents the cost of raising external capital, given by:

$$\phi = \phi_1 K + \frac{\phi_2}{2} K^2, \tag{8}$$

and ℓ and ξ represent the extent to which the sponsor discounts the gains or losses of shareholders and external financiers, respectively, capturing the misalignment of interests or agency costs. Both parameters range from zero to one, with higher values indicating greater agency costs in the sponsor's decision-making. For example, $\ell = 0.2$ implies that for each dollar gained or lost by shareholders, the sponsor perceives it as a gain or loss of $1 - 0.2 = 0.8$ dollars to himself.

While we don't explicitly model the microfoundations of ℓ and ξ, these sponsor-specific characteristics effectively summarize various underlying economic forces. They may implicitly reflect the sponsor's reputational concerns, legal constraints, financial incentives, and other complex interactions influencing behavior towards different investor groups. In our analysis henceforth, we set $\xi = 0$, assuming negligible agency costs between the sponsor and FPA/PIPE investors. This assumption is based on the nature of these investments: FPAs typically represent wealth tied to the sponsor or their associates, eliminating the sponsor's financial incentives to exploit these investors. PIPEs, provided by large institutional investors, carry strong potential for legal recourse if mishandled. By setting $\xi = 0$, we focus on modeling and estimating the more pronounced agency frictions between sponsors and SPAC shareholders, captured by the parameter ℓ.

3.3 Information and timeline

Based on the model setup, each deal can be characterized as a three-tuple (ℓ, z, u), with ℓ capturing the agency friction between the SPAC sponsor and shareholders, z measuring the value created or destroyed in the deal between the SPAC and its target, and u serving as the target's reservation value. The model takes the tuple as the state variable associated with each deal, which we refer to as the *deal fundamentals* henceforth. The tuple varies across deals and represents the key information asymmetry among the SPAC shareholders, the sponsor, and the target. Specifically, we assume that both the sponsor and the target can observe the deal fundamentals, while SPAC shareholders do not know them directly. Instead, SPAC shareholders only observe the *deal terms* proposed by the sponsor and target, including the promote shares θ, the PIPE/FPA financing K, and the offer made to the target, $\frac{n}{N}$.

Besides deal terms $(\theta, K, \frac{n}{N})$, SPAC shareholders also observe the reputation of sponsors, which we measure empirically based on the sponsors' past experience with SPACs.[7] In reality, shareholders often view sponsor reputation as a signal of the expected return sponsors can deliver. In the model, we specify the sponsor's reputation as a dummy variable D_H, with $D_H = 1$ indicating high-reputation and $D_H = 0$ low-reputation. We allow D_H to correlate with the $deal fundamentals$ and thus affect the expected return to SPAC shareholders. Specifically,

$$P(D_H = 1) = \frac{1}{1 + e^{b_0 + b_1 \cdot \ell + b_2 \cdot z + b_3 \cdot u}} \tag{9}$$

where b_1 to b_3 determine the correlation between sponsor reputation and deal fundamen-

[7]Our baseline model considers a sponsor's reputation to be high if he has successfully completed at least three prior de-SPACs. We also consider alternative reputation measures based on sponsor professional background and their past de-SPAC performance as robustness checks and find quantitatively similar results (see Appendix B for details).

tals, and b_0 determines the baseline fraction of high-reputation sponsors.

Since SPAC shareholders do not observe deal fundamentals, they cannot calculate their de-SPAC return precisely through Equation 2 to 5. Instead, they have to infer the expected return from the observable variables, including the deal terms and sponsor reputation. To capture shareholders' decision-making, we adopt a flexible specification.

Specifically, the de-SPAC return R_{sh} can be projected onto the observable variables through an OLS regression:

$$R_{sh} = a_0 + a_1 \cdot \theta + a_2 \cdot \ln(1+K) + a_3 \cdot \ln\left(\frac{n}{N}\right) + a_4 \cdot D_H + \epsilon \tag{10}$$

where ϵ is the residual with mean zero and standard deviation of σ_ϵ. In the model equilibrium, we require that shareholders have a rational expectation of the regression coefficients a_0 through a_4, consistent with what can be obtained from the regression empirically. The linear projection based on these coefficients and the observables constitutes the *public* information the shareholders use to infer the expected return.

In reality, shareholders may also possess private information that goes beyond the deal terms and sponsor reputation or they may utilize more advanced prediction models that capture the non-linear effects of these observable variables. To capture such nuanced information latent to econometricians, we endow each individual shareholder i with a *private* signal η_i, which is informative of the de-SPAC return R_{sh}:

$$\eta_i = R_{sh} + e_i \tag{11}$$

where e_i is an i.i.d. draw from the common distribution of $N(0, \sigma_e)$. Intuitively, the smaller σ_e is, the more accurate shareholders' private information is. In the extreme case when $\sigma_e = 0$, shareholders knows exactly the true value of R_{sh}.

We assume that shareholder i makes his conjecture of de-SPAC return as a weighted average of the public information and his private signal:

$$\begin{aligned}
&\mathrm{E}_i\left[R_{sh} | \theta, K, \frac{n}{N}, D_H, \eta_i\right] \\
=&(1-\chi) \cdot \left(a_0 + a_1 \cdot \theta + a_2 \cdot \ln(1+K) + a_3 \cdot \ln\left(\frac{n}{N}\right) + a_4 \cdot D_H\right) + \chi \cdot \eta_i
\end{aligned} \tag{12}$$

where $\chi = \frac{\sigma_\epsilon^2}{\sigma_\epsilon^2+\sigma_e^2}$ is chosen to minimize the forecast errors.[8]

Figure 1 summarizes the timeline of the model. The information set available to each participant is highlighted in blue, while the actions taken by the agent are marked in red. The de-SPAC process is divided into three phases. First, the sponsor approaches a target firm, and both parties observe the true values of (ℓ, z, u) related to the deal. They negotiate the deal terms $(\theta, K, \frac{n}{N})$ and announce the deal to the public if it generates positive surplus for both. Next, SPAC shareholders decide whether to redeem their shares after observing the proposed deal terms, the sponsor's reputation, and their private signals. Shareholders' redemption decisions aggregate to a fraction, δ, of the IPO shares being redeemed. Finally, the outcome of the proposed de-SPAC—whether it succeeds or fails—is determined by nature based on the redemption rate and the amount of external capital raised by the time of de-SPAC. In the model, the redemption rate reflects shareholders' collective assessment of the deal's quality, while the external capital raised reflects the sponsor's outlook on the deal's prospects. A low redemption rate coupled with substantial external capital typically signals a more favorable deal, thereby increasing the likelihood of approval by SPAC shareholders. These factors also determine the cash deliverable to the target post de-SPAC, $C = 1 - \delta + K$, which may play an important role in securing the target's consent to the deal. Consequently, we assume that the probability of deal completion is given by:

$$q = \frac{1}{1 + e^{c_0 + c_1 \cdot (1-\delta+K)}} \tag{13}$$

If the proposed deal fails, the SPAC is liquidated and the target remains private. Meanwhile, all proceeds are returned to the shareholders, and sponsor compensation is voided. If the proposed deal completes, the true value of the combined firm is realized, and different participants claim their ownership in the combined firm following our discussion in Section 3.1. The payoff to the shareholders is 1 if they redeem or if the deal fails, and p if they stay and the deal completes.

[8]The optimal weight χ is chosen to minimize the mean squared forecast error, that is:

$$\chi = \arg\min \mathrm{E}\left[R_{sh} - \mathrm{E}_i[R_{sh}|\theta, K, \frac{n}{N}, D_H, \eta_i]\right]^2 = \arg\min (1-\chi)^2\sigma_\epsilon^2 + \chi^2\sigma_e^2$$

and the F.O.C. yields the result.

3.4 Optimal deal terms and redemption

The optimal deal terms $(\theta^*, K^*, \frac{n}{N}^*)$ are chosen to maximize the sponsor and target's joint expected surplus from the de-SPAC, taking into account the anticipated redemptions of shareholders and the resulting deal completion rate q subsequently:

$$\begin{aligned} \left(\theta^*, K^*, \frac{n}{N}^*\right) &= \arg\max_{\theta, K, \frac{n}{N}} \quad \mathrm{E}\left[q\left(\rho \cdot U_{sp} + (1-\rho)\cdot U_{tar}\right)\right] \\ s.t. \quad U_{sp} \geq 0, &\quad U_{tar} \geq 0, \end{aligned} \tag{14}$$

where U_{tar} and U_{sp} are given by Equation 6 and 7, respectively; and $\rho \in [0, 1]$ determines the relative bargaining power between the sponsor and the target. The expectation is taken over the uncertainty of shareholder redemption – since the deal terms are chosen before shareholders make their redemption decisions, the sponsor and target need to form an expectation of the redemption rate δ in order to compute U_{tar} and U_{sp}. Each individual possesses a private signal of η_i, and the redemption rate, δ, is derived by aggregating individual shareholder's redemption decisions, which we detail below. We assume that the sponsor and target have rational expectations of δ in equilibrium.

Shareholders decide whether to redeem their shares based on their conjectured returns from the de-SPAC. As discussed above, without knowing the deal fundamentals, shareholders are unable to compute the exact returns using Equation 5, and instead form their expected return from Equation 12 using the observed deal terms, sponsor reputation, and their private signals. Both deal terms and sponsor reputation are public information, and they have the same impact on all shareholders. Individual shareholders receive heterogeneous private signals, which then lead to different conjectured returns across shareholders.

Each individual shareholder, i, chooses to redeem if $\mathrm{E}_i[R_{sh}|\theta, K, \frac{n}{N}, D_H, \eta_i] < 0$, where $\mathrm{E}_i[R_{sh}|\theta, K, \frac{n}{N}, D_H, \eta_i]$ is defined in Equation 12. The aggregate redemption rate, δ^*, equals the fraction of shareholders whose expected return from staying is negative:

$$\delta^* = \mathrm{E}_{e_i}[\mathbb{1}_{\{\mathrm{E}_i[R_{sh}|\theta, K, \frac{n}{N}, D_H, \eta_i] < 0\}}] \tag{15}$$

It is important to note that, in the model, the sponsor and target do not know individual shareholder's private signals, η_i, and thus cannot figure out individual redemption decisions, $\mathbb{1}_{\{E_i[R_{sh}|\theta,K,\frac{n}{N},D_H,\eta_i]<0\}}$, which are determined by Equation 12. However, they are able to anticipate the aggregate redemption rate, δ^*, given their knowledge of R_{sh} and the distribution of e_i.

3.5 Model equilibrium

In equilibrium, the sponsor and target observe the deal fundamentals (ℓ, z, u) and choose the deal terms $\left(\theta^*, K^*, \frac{n}{N}^*\right)$ to maximize their joint surplus, anticipating the impact of the given deal terms on the aggregate redemption rate, δ^*. Shareholders decide whether to redeem their shares by inferring their returns from the de-SPAC using the observed deal terms, sponsor reputation, and their private signals. In equilibrium, each agent solves his optimization problem subject to his information set and has rational expectations consistent with the equilibrium outcome. We define the Bayesian Nash Equilibrium below.

Bayesian Nash Equilibrium: A Bayesian Nash Equilibrium is defined as the set of optimal deal terms $(\theta^*, K^*, \frac{n}{N}^*)$, the inference rule of shareholder returns $\{a_0, a_1, a_2, a_3, a_4\}$, and the aggregate redemption rate δ^* such that:

1. $(\theta^*, K^*, \frac{n}{N}^*)$ solves the sponsor's and target's value maximization problem defined in Equation 14, taking into account its impact on shareholder redemption, δ^*;

2. The aggregate redemption rate, δ^*, as defined in Equation 15, is determined by shareholders' inference rule for the de-SPAC return, characterized by the parameter vector $\{a_0, a_1, a_2, a_3, a_4\}$;

3. The de-SPAC return to non-redeeming shareholders, R_{sh}, is determined by the deal fundamentals, (ℓ, z, u), deal terms, $(\theta^*, K^*, \frac{n}{N}^*)$, and the aggregate redemption rate, δ^*, as in Equation 5;

4. Shareholders' inference rule, $\{a_0, a_1, a_2, a_3, a_4\}$, is consistent with the coefficients obtained from regressing the de-SPAC return, R_{sh}, on the deal terms and the sponsor's reputation, as in Equation 10.

We solve the Bayesian Nash Equilibrium using a nested fixed point algorithm. Specifically, given an initial guess of the inference rule, $\{a_0, a_1, a_2, a_3, a_4\}$, we solve for the optimal deal terms chosen by the sponsor and target as well as the aggregate redemption of all shareholders. Simulating a cross-section of SPACs and their de-SPAC outcomes from the model, we regress the realized de-SPAC returns on deal terms and sponsor reputation and update the inference rule $\{a_0, a_1, a_2, a_3, a_4\}$. We repeat this iterative procedure until the inference rule converges, indicating that the rational expectations are fulfilled. More details of the numerical algorithm are presented in Appendix A.

4 Data

The construction of our sample begins by focusing on SPACs that completed their business combinations by the end of the first quarter of 2022 (i.e., by March 31st, 2022). For each SPAC we rely on several sources of data to gather its information, much of which has to be meticulously gleaned by going through individual SEC filings and their associated attachments. Specifically, we gather information about SPAC IPOs from the registration statement, the prospectus, and any Form 8-K filed shortly after the IPO. These include information on the size of the offering, the exercise (or not) of the over-allotment option, the structure of a SPAC unit, the nature and size of the SPAC's private placement that accompanies the IPO and helps to fund the SPAC trust, the identities of the sponsor and other SPAC participants, the geographic or sector focus of the search for a target, etc.

Once the SPAC finds a target and signs a non-disclosure agreement (NDA), the SPAC typically announces the deal and terms and posts an investor presentation, all within or attached to a Form 8-K. These allow us to view the terms of eventual deals at the time they are announced. We obtain the final terms of the deal in the "Super 8-Ks" that are filed shortly after the deal closes. From these, we are able to gather various deal-specific variables. The Super 8K often contains numerous attachments which include a press release, a condensed pro-forma financial statement, sponsor agreements, shareholder agreements, etc., in addition to the 8-K filing itself, any of which can potentially contain useful information. We use these filings to gather information on sponsor and target earn-outs, any forfeited promote shares or sponsor warrants, information about the consideration paid in the deal, as well as any PIPE, FPA, or backstop financing raised through the unregistered sale of securities.

We obtain information on redemptions primarily from the Gritstone SPAC research database, which covers the vast majority of the SPACs we analyze. For deals outside the Gritstone database, we find the redemption information from the aforementioned Super 8-Ks or prospectuses.

Sponsors differ in their expertise and experience in the SPAC market. Reputable sponsors may be more capable in identifying good merger opportunities or attracting more established targets. Shareholders may trust reputable sponsors more and thus are less likely to redeem their shares. We classify sponsors into two groups (high vs. low reputation) based on their past experience. Specifically, for each SPAC, we count the number of past de-SPAC transactions the sponsor had completed before the current one. We define the sponsors who have completed three or more de-SPAC deals before the current as high-reputation sponsors, indicated by $D_H = 1$, and other sponsors as low-reputation sponsors, indicated by $D_H = 0$. In our sample, about 6% of SPACs were created by high-reputation sponsors.[9]

Finally, we obtain pricing data mainly from the Center for Research in Security Prices (CRSP). Our primary performance metric is to compute a 12-month post-merger return relative to the baseline \$10 redemption price, corresponding to the model's construct of the de-SPAC return (see e.g., Gahng et al., 2023 and Klausner et al., 2022). We supplement the pricing data with alternative sources (e.g., Yahoo Finance or WRDS OTC End-of-Day Pricing database, etc.) as much as possible if such information is missing from CRSP. Given that SPAC targets are newly public firms following the de-SPAC, the Renaissance IPO ETF (Ticker: IPO) serves as a natural benchmark against which to compute post de-SPAC risk-adjusted returns (alpha). The Renaissance IPO ETF tracks an index composed of companies that have recently completed a public listing.

Altogether, after assembling the data, our sample contains 344 SPACs with complete

[9] As robustness checks, we considered alternative measures of sponsor reputation, including a performance-based measure, where we consider sponsors who delivered top-quartile returns in at least one prior de-SPAC transactions as high reputation, and a background-based measure, where we consider sponsors who had previously completed at least one de-SPAC or had a background in PE/VC as high reputation. Our results were qualitatively similar based on these measures.

information for an estimation. This represents 88% of all SPACs (388) that had completed their business combinations by March 31st, 2022.[10] This number drops to 307 when we use 12 months of post de-SPAC returns to measure performance, due to acquisitions and bankruptcies. Most of the deals were completed during the recent boom in 2020 and 2021, with the trend continuing into the first quarter of 2022.

In order to put variables on the same terms as our model set-up, we perform necessary normalization and adjustments. In our model, we normalize SPAC IPO shares to one, and thus in constructing the model's empirical counterparts, we normalize ownership-related variables in the data by the number of IPO shares, so such variables are stated in multiples of IPO shares. This normalization is applied to, for example, PIPE and other private placement shares, shares paid as consideration to the target owners, redemptions, and sponsor stake.

Our model assumes that all SPAC mergers strictly use shares as the consideration paid to the target shareholders. However, in reality, some deals in our sample involve cash consideration. We make the following adjustment to accommodate cash consideration. We divide the cash consideration by the price at the end of the performance period (12 months post de-SPAC), to get a cash-equivalent number of shares. This allows us to convert all cash consideration to shares, yet leave all parties' returns unaffected by the adjustment. Note that these adjustments tend to be minor, as less than 10% of our sample of SPAC acquisitions (only 31 of our sample of 344) have a significant amount of their consideration paid in cash.

Table 1 provides summary statistics on variables of interest. Panel A provides the raw data, and Panel B provides summary statistics on a subset of the same variables, with their values scaled by the number of IPO shares, to better align with our model.

5 Model Estimation

In order to bring the model to the data, we need to make additional assumptions about the distribution of the state variables. Specifically, we assume that $1 + z$ and u, which correspond to the deal quality and the standalone value of the target company, follow

[10] Gritstone lists 388 SPACs as completing their business combinations through Q1 of 2022. Most of the SPACs we left out were early ones for which pricing or other information is not publicly available.

independent log-normal distributions, i.e., $\ln(1+z) \sim N(\mu_z, \sigma_z^2)$ and $\ln(u) \sim N(\mu_u, \sigma_u^2)$. ℓ, which captures the agency conflict of SPAC sponsors, follows a Beta distribution, $\ell \sim B(\alpha, \beta)$. The Beta distribution is defined on the interval $[0, 1]$, aligning with the definition of ℓ in our model. It also nests several common distributions, such as the uniform and exponential distributions, offering flexibility to better fit the data.

In addition, the model solution also depends on the number of warrants issued in SPAC IPOs (as part of the units). To produce the cross-section of SPAC deals in model simulation, we first solve the model for different numbers of warrants issued, w. Then we simulate the model to generate a panel of SPACs with their numbers of warrants w equal to the empirical distribution obtained from the data. The most common number of warrants issued in each unit is 1/3, 1/2, and 1, and there are also a few SPACs with no warrants, or 1/5, 1/4, or 3/4 warrants in each unit. Our simulated data replicates this empirical distribution by construction.

5.1 Identification

There are 17 model parameters to be estimated, including ϕ_1 and ϕ_2 that control the costs of raising external capital; α and β that shape the Beta distribution of the sponsor's agency cost; μ_z, μ_u, σ_z, and σ_u that set the mean and standard deviation of the normal distribution for $\ln(1+z)$ and $\ln(u)$; b_0, b_1, b_2 and b_3 that correlate sponsor reputation to deal fundamentals in Equation 9; χ that specifies the weight shareholders place on their private signal in inferring de-SPAC returns as in Equation 10; σ_e that describes the dispersion of private signals across SPAC shareholders; c_0 and c_1 that control the level and sensitivity of deal completion rate in Equation 13, and ρ that affects the relative bargaining power between the sponsor and target in Equation 14.

It is worth noting that the coefficients of the inference rule, a_0 through a_4 in Equation 10, are not parameters to be estimated, because they are endogenously pinned down in the model equilibrium by fulfilling the rational expectation conditions.

In this section, we discuss what data features help us identify these parameters in estimating the model. First, the distribution of external capital raised, K, is highly informative of ϕ_1 and ϕ_2. A high variable cost makes it more costly to raise external capital and thus decreases the average value of K in the data. Meanwhile, a high convexity

ϕ_2 makes it particularly expensive to raise a large amount of external capital and thus reduces the dispersion of K. We use the mean and standard deviation of $\ln(1+K)$ to discipline our estimates of these two parameters.

Second, the sponsor's agency cost, ℓ, has a large impact on the distribution of the sponsor's compensation θ. Intuitively, if the agency cost is low, the sponsor has less incentive to divert value from SPAC shareholders and thus is more willing to concede on their compensation, θ, especially in deals with only modest value creation, where such concession is necessary to retain shareholders. In the model, sponsor agency cost, ℓ, is assumed to follow a Beta distribution, where two parameters, α and β, determine the shape of the probability distribution function. In general, a low α and a high β (e.g., $\alpha \leq 1$ and $\beta > 1$) tilt the distribution to the left, while a high α and a low β (e.g., $\alpha > 1$ and $\beta \leq 1$) tilt the distribution to the right. When both α and β are low (e.g., $\alpha < 1$ and $\beta < 1$), the distribution becomes bi-modal, with most of the probability mass concentrated at the tails. Conversely, when both are greater than 1, the distribution tends to be hump-shaped. The Beta distribution reduces to a uniform distribution when $\alpha = \beta = 1$. We, therefore, use the mean and standard deviation of θ in the data to pin down α and β. As a validity check, we also examine the distribution of θ to ensure that the estimates of α and β generate a close model fit of θ throughout the spectrum.

Third, the value of the target as a private entity, u, serves as the target's reservation value in a proposed de-SPAC. Thus, the larger the private target, the more shares (or a larger fraction) of the combined firm will be allocated to them in merger consideration. The distribution of the number of shares offered to the target, n (or as a fraction of the combined firm , $\frac{n}{N}$) reveals important information about the distribution of u. We use the mean and standard deviation of $\frac{n}{N}$ to discipline the estimates of μ_u and σ_u.

Fourth, the value creation via de-SPAC is captured by z, which is then shared among all agents post de-SPAC. The combined firm's stock price relative to the face value of SPAC shares (normalized to 1 in the model and \$10 in the data), which we define as the de-SPAC return, reflects this information. We use the mean and standard deviation of the de-SPAC return to discipline the cross-sectional distribution of z.

Fifth, the coefficients b_0, b_1, b_2, and b_3 determine the correlation between sponsor reputation and deal fundamentals (ℓ, z, and u) through Equation 9. Identification of these parameters are relatively straightforward. First, the constant term b_0 is identified off the fraction of sponsors with high reputation. To identify the sensitivity parameters, b_1, b_2 and b_3, we compare the observable deal terms for sponsors with $D_H = 1$ and $D_H = 0$. These deal terms are determined endogenously by the sponsors based on their knowledge of the deal fundamentals, ℓ, z, and u, and are thus largely reflective of these fundamentals. For instance, the fraction of shares offered to the target, $\frac{n}{N}$, is largely determined by target private value, u, and thus we compute average $\frac{n}{N}$ in deals with $D_H = 1$ and separately in deals with $D_H = 0$. If the difference between them is significantly positive, meaning that reputable SPAC sponsors are more likely to attract established targets, then the estimate of b_3 tends to be significantly negative in Equation 9.

Sixth, shareholders conjecture de-SPAC returns based on both publicly observed signals (i.e., deal terms $(\theta, K, \frac{n}{N})$ and sponsor reputation D_H) and their private signal η_i. If they place little or zero weight on their private signal (i.e., χ is close to zero), then their redemption decision is mostly driven by the publicly observed signals, and in this case, the redemption rate should be uncorrelated with de-SPAC returns *conditional on* the public signals. On the other hand, if shareholders place significant weight on their private signals, then their redemption decisions should correlate negatively with de-SPAC returns even after purging out the public signals. To identify χ, we first purge the effect of the publicly observable variables from both the de-SPAC returns and the redemption rate by running the following two regressions:

$$R_{sh} = \lambda_0 + \lambda_X \cdot X + \varepsilon_R \tag{16}$$

$$\delta = \gamma_0 + \gamma_X \cdot X + \varepsilon_\delta \tag{17}$$

where X is a vector of public signals, including deal terms and sponsor reputation.[11] We obtain the regression residuals, ε_R and ε_δ, and then regress ε_R on ε_δ:

$$\varepsilon_R = \tau \cdot \varepsilon_\delta + \zeta \tag{18}$$

[11] Instead of using $\theta, K, \frac{n}{N}$ directly in X, we use their quartile dummies, which are shown to yield more robust results as we match the model to the data (Bazdresch et al., 2018). Specifically, we define $X = \{1_{\theta<0.25}, Q_{K,2}, Q_{K,3}, Q_{K,4}, Q_{\frac{n}{N},2}, Q_{\frac{n}{N},3}, Q_{\frac{n}{N},4}, D_H\}$, where $Q_{x,i}$ are dummy variables that indicate whether variable x falls into the i-th quartile. The quartile dummies that indicate the first quartile, $Q_{K,1}$ and $Q_{\frac{n}{N},1}$ are omitted so that the first quartile is used as the base.

A more negative loading of τ suggests a greater weight, χ, that shareholders place on their own private signals.

Next, we identify the dispersion of shareholders' private signals, σ_e, through the cross-sectional distribution of the redemption rate δ. The intuition is that, if σ_e is small, shareholders' conjecture of de-SPAC return is more homogeneous within each deal, leading to coordinated redemption decisions. In this case, the aggregate redemption rate, δ, is either close to zero (if shareholders view the de-SPAC return as positive) or close to one (if they view the de-SPAC return as negative), and it implies a polarized distribution of the redemption rate in the cross-section. However, if σ_e is large, shareholders' conjecture of de-SPAC return is more heterogeneous, leading to dispersed redemption decisions across shareholders. This produces a less extreme, smoother distribution of aggregate redemption rates in the cross-section of SPACs. We use the standard deviation of δ to identify σ_e: a larger standard deviation of δ implies a lower σ_e.

We next discuss the identification of c_0 and c_1 that affect the deal completion rate in Equation 13. We use the average deal completion rate to identify c_0. Specifically, we compute the deal completion rate as the number of SPACs that successfully completed their deals divided by the total number of SPACs that either completed deals or had their deals fail. A higher deal completion rate implies a more negative c_0.

Ideally, if we could observe the redemption rate and external capital raised for all SPACs — regardless of whether a deal was completed — we could identify c_1 by examining the correlation between cash deliverable and deal completion. Intuitively, stronger correlations would indicate a more important role for cash deliverable, leading to a higher estimate of c_1. In practice, however, the redemption rate is always recorded as 100% and external capital raised as zero if SPACs failed to complete their mergers.[12]

To overcome this identification challenge, we rely on a critical model mechanism. Specifically, external financing, K, plays two roles in the model. First, sponsors have the incentive to bring in external financiers in good deals and share profits with them, in exchange for the credibility these outside investors lend to the deal. We refer to this as

[12]In these SPACs there is no Super 8K, so redemptions and/or external financing raised in the form of PIPEs/FPAs are harder to track down. Moreover, in the event of a liquidation, the redemption rate is 100% by definition, and we are unable to observe any external financing because these are contingent on deal completion.

the *certification* effect of PIPEs/FPAs. Second, if the deal completion rate is sensitive to cash delivered, sponsors may have an incentive to bring in external financing to backstop against redemptions in bad deals. We refer to this as the *financing* effect of PIPEs and/or FPAs. These two effects counteract one another in driving the correlation between deal quality and external financing, K. Leveraging this mechanism, we use the regression coefficients of the de-SPAC return R_{sh} on external financing, K, (i.e., coefficient λ_X in Equation 16) to identify c_1. If c_1 is more negative, cash deliverable plays a more pivotal role in driving deal completion, and thus, the financing effect is stronger. In this case, we expect a more negative relationship between R_{sh} and K, because more external financing suggests a stronger demand to backstop redemptions and, thus weaker deal quality. Specifically, we partition SPACs into quartiles by their amount of external financing and use the dummy variables, $Q_{K,2}$, $Q_{K,3}$, and $Q_{K,4}$, to denote SPACs belonging to the 2nd, 3rd, and 4th quartile of the external financing distribution, respectively. We then regress R_{sh} on these quartile dummies to examine this relationship.

Lastly, we estimate ρ, the sponsor's bargaining power, by matching the association between de-SPAC return R_{sh} and the offer made to the target $\frac{n}{N}$. In the model, $\frac{n}{N}$ is determined by two factors. The first is the target's private value u, and the second is the target's relative bargaining power. If ρ is small, the target takes a strong bargaining position and thus can capture a large fraction of the combined firm value. In this case, a high value of $\frac{n}{N}$ mostly reflects an overpayment to the target that reduces the de-SPAC return to shareholders. This would negatively tilt the association between R_{sh} and $\frac{n}{N}$. However, if ρ is large, the sponsor and shareholders would capture the lion's share of the surplus, and in this case, a large $\frac{n}{N}$ mostly reflects a greater fundamental value of the target and thus a higher synergy to be shared (i.e., u and $z \cdot u$ are large). This leads to a higher de-SPAC return to shareholders and tilts the association between R_{sh} and $\frac{n}{N}$ towards positive. Leveraging this model mechanism, we use the regression coefficients λ_X in Equation 16 to identify ρ. Specifically, we sort SPACs into quartiles based on $\frac{n}{N}$, and use the dummy variables, $Q_{\frac{n}{N},2}$, $Q_{\frac{n}{N},3}$, and $Q_{\frac{n}{N},4}$, to denote SPACs belonging to the 2nd, 3rd, and 4th quartile of offer distribution. We then regress the de-SPAC return R_{sh} on these quartile dummies to examine this relationship.

5.2 Model fit

In addition to the identifying moments discussed in Section 5.1, we also include other moments that pertain to the central mechanism in the model and influence the sponsors' design of deal terms. As a result, we have an overidentified system with 33 moments. These moments are particularly informative of information asymmetry between shareholders and sponsors in the model, and they reveal how shareholders infer their de-SPAC returns based on the observed deal terms and sponsor reputation. They also contain critical information that allows us to back out shareholders' private signals, as discussed in Section 5.1 above.

In SMM estimation, we choose the parameter values to minimize the distance between the model-implied moments and their data counterparts:

$$Q(\Theta) = [M^d - M^s(\Theta)]' W^* [M^d - M^s(\Theta)] \tag{19}$$

where Θ denotes the vector of model parameters, M^d are the data moments, and $M^s(\Theta)$ are the model-implied moments constructed from simulation. W^* represents the optimal weighting matrix, estimated as the inverse of the variance-covariance matrix of the moments.

Table 2 reports the model fit. In the model, as in the data, the average external capital raised is above 70% the size of the SPAC IPO, but the cross-sectional variation is also very large. The average redemption rate is high, both in the data and in the model (around 50%), and redemption also exhibits high dispersion. The model does a good job of fitting the distribution of the sponsor's compensation in the data. The fact that the average θ equals 0.22, which deviates only slightly from its default value of 0.25, suggests that sponsors, on average, rarely forfeit their compensation. The sizeable dispersion, however, indicates that sponsors vary widely in how they make this important decision. The model is also able to fit closely the distribution of shares offered to the target. On average, the target shareholders get more than two-thirds of the combined firm value, with substantial variation across deals.

SPAC shareholders fare poorly from de-SPACs if they see through the business combination. On average, non-redeeming shareholders lose 9%, as measured by 1-year post de-SPAC abnormal returns, and the cross-sectional variation in post de-SPAC returns is large. The model captures these stylized facts, suggesting that non-redeeming shareholders face high risk in the de-SPAC process. However, inferring the viability of SPACs based on this number alone can be misleading, as we elaborate further in Section 6.1.

Sponsor reputation correlates with deal outcomes. Specifically, high-reputation sponsors are associated with higher de-SPAC returns and a larger fraction of shares allocated to targets, which jointly suggest that reputable sponsors attract more established targets and create more value for shareholders. Interestingly, high-reputation sponsors are not more inclined to forfeit their compensation compared to low-reputation sponsors. This is partly because these sponsors do not need to forfeit their shares to retain shareholders if they bring in good deals. Meanwhile, our estimation also suggests that sponsor reputation is only weakly (negatively) correlated with sponsor agency cost. In other words, more reputable sponsors do not necessarily prioritize their shareholders more.

To uncover how shareholders infer deal quality and expected de-SPAC return from observables, we regress de-SPAC returns on deal terms and sponsor reputation. The model does a good job of matching most regression coefficients not only qualitatively but also quantitatively. In both the model and the data, we find that the tendency for sponsors to forfeit their compensation is negatively correlated with de-SPAC returns. This relationship is driven by two opposing effects. First, sponsors choose to forfeit their shares only in bad deals as they anticipate large redemptions, and thus, forfeiting compensation signals a pessimistic outlook of deal quality. Second, as sponsors forfeit their compensation, they effectively allocate a greater fraction of the combined firm to shareholders and targets (and away from themselves), which improves shareholder returns given the total value created in the de-SPAC. Empirically, the first force appears to dominate, and our model replicates this pattern.

De-SPAC returns load positively on the amount of external capital raised, K, suggesting that deals that raise extra cash on average deliver higher returns. The correlation between de-SPAC return and K also reflects the net effect of two counteracting forces. On the one hand, external financiers, such as PIPE or FPA investors, are sophisticated, and sponsors have to internalize their welfare to a greater extent. As a result, participation of PIPE or FPA investors can be viewed as a positive signal of deal quality, consistent with the *certification effect*. On the other hand, sponsors are incentivized to bring in external financing to backstop against the large redemptions expected in bad deals, and thus a large amount of external capital raised may indicate the demand for extra cash to ensure deal completion. We refer to this channel as the *financing effect*. The model matches the empirical pattern that the certification effect dominates, thereby creating a positive association between external financing and de-SPAC returns.

De-SPAC returns load negatively on the fraction of shares allocated to targets in the data, and the estimated model is able to replicate this empirical pattern closely. The correlation between de-SPAC return and targets' allocated share is again a manifestation of two competing effects. First, according to our estimation, a majority of SPACs create value via the de-SPAC, and merging with a larger target creates greater room for such a synergistic effect. These targets with larger pre-merger valuation also demand a larger stake, $\frac{n}{N}$, in the post-merger company. We refer to this channel as the *synergy effect*. Second, targets' allocated share, $\frac{n}{N}$, is also affected by the relative bargaining power between sponsors and targets. Given the total size of the pie, a greater share allocated to the target mechanically implies a lower (residual) return for shareholders. We refer to this channel as the *distribution effect*. In both the model and the data, the distribution effect dominates and results in a negative correlation between de-SPAC return and $\frac{n}{N}$.

Moreover, as one may expect, the de-SPAC return loads positively on sponsor reputation, consistent with the notion that reputable sponsors are more likely to attract well-established targets and generate greater value by taking them public.

The above results show that deal terms and sponsor reputation contain critical information for shareholders to infer de-SPAC returns. Since shareholders make their redemption decisions based on this inference, the same variables should also predict redemption rates—a core implication of the model. To validate this mechanism, we regress the redemption rate on deal terms and sponsor reputation and include the loadings as additional moments in the estimation. Consistent with the model mechanism, these loadings have the opposite signs of those in the de-SPAC return regression: redemptions are higher when sponsors forfeit compensation or when a larger ownership share is allocated to the target. Conversely, PIPE/FPA participation and sponsor reputation are associated with lower redemptions. The model closely replicates these empirical patterns.

Do shareholders rely on information beyond deal terms and sponsor reputation to infer de-SPAC returns? To answer this question, we examine the residuals from the regressions in Equations 16 and 17, which capture variations in de-SPAC returns and redemption rates unexplained by these publicly observed variables. If shareholders incorporate additional private or unobserved information in their redemption decisions, the two residuals should be negatively correlated. This is exactly what we find: regressing ε_R on ε_δ yields a strong negative coefficient of –0.6. The estimated model closely replicates this pattern.

Lastly, the model also produces an average probability of deal completion of 0.85, exactly matching its empirical counterpart. It shows that in our sample, the vast majority of SPACs were able to complete their mergers.

Overall, the model fits the data and captures important empirical patterns. To further validate its fit, we compare the full distribution of key observables, θ, K, $\frac{n}{N}$, δ, C, and R_{sh} in Figure 3. The model matches the distributions of these variables closely, which lends further support to its underlying mechanisms. To formally assess the distributional fit, we compute the Bhattacharyya distance (BD) for each variable, with values ranging from 0.02 to 0.109 and averaging 0.049, indicating a strong overall fit of the model.

5.3 Parameter Estimates

Table 3 presents the parameter estimates. Our estimate of deal quality, z, characterizes the pool of private firms available to SPACs, which differs from the subset that ultimately goes public as the de-SPAC process imposes a selection effect, making the available private firms' distribution different from the observed SPAC targets' distribution. Our estimate of z captures the former, while the latter emerges as an equilibrium outcome. We estimate that $1 + z$, which follows a log-normal distribution, has a mean of -0.04 and a standard deviation of 0.26. This estimate suggests that z is very close to zero for an average private firm in the SPAC market.[13] This estimate is in line with recent studies that suggest private firms that seek to go public via SPAC mergers are, on average, weaker, in fundamentals, than those that seek to go public through an IPO (Gantchev, 2013; Bai et al., 2021; Klausner et al., 2022; Kolb and Tykvova, 2016). Our estimate of a large standard deviation of z further suggests that uncertainty associated with

[13]The average value of z is calculated as $E[z] = e^{-0.04+\frac{1}{2}(0.26)^2} - 1 =$ -0.006.

target quality is substantial, and this high uncertainty could expose SPAC shareholders to great risks, especially when information is asymmetric and incentives are misaligned. Even though our paper does not explicitly model a firm's choice between merging with a SPAC and going public through a traditional IPO, we do not rule out the possibility that some firms could go public via a traditional IPO at some future time but instead opt for the SPAC route due to considerations such as speed, cost, or other strategic factors. Accordingly, the variable u, which represents a target's standalone value, also captures the option value of seeking alternative paths to the public market in the future.

Adding to the uncertainty of z, we find that the variation in u is also large. Normalizing SPAC IPO proceeds to one, we find that the average size of a private firm that seeks to merge with a SPAC is about 4.2, and the standard deviation is 5.8. The large uncertainty associated with the target's standalone value adds to the challenge that SPAC shareholders face in assessing a sponsor's proposed offer.

Turning to external capita, both the linear and convex costs of raising capital are estimated to be significant. The marginal cost of raising an additional dollar through PIPEs or FPAs is estimated to be about 4 cents per dollar for a SPAC with a capital raise at the 75th percentile. Overall, this cost seems relatively modest but is consistent with anecdotal evidence and intuition.[14] Notably, most FPA contributions come from the sponsors themselves, likely at little or no cost. This finding suggests that financing costs are not the primary barrier to using external capital in SPACs, and most SPACs do not face significant cash constraints.

Our model uses a flexible Beta distribution to characterize the sponsor's agency cost, ℓ. We estimate the shape parameters $\alpha = 1.02$ and $\beta = 1.90$, implying an average ℓ of 0.3 in equilibrium — meaning a typical sponsor values one dollar of shareholder gain as 70 cents of his personal benefit. For comparison, a uniform distribution would imply an average of 0.5, or a 50-cent equivalence. Hence, our estimate of sponsor agency costs is more optimistic than what a uniform distribution of ℓ would suggest.

The parameters, b_1, b_2, and b_3, indicate the correlation between deal fundamentals

[14] In a study produced by the office of Senator Elizabeth Warren, frequent SPAC sponsor Cantor Fitzgerald notes a fee of 3% of PIPE proceeds raised, paid to underwriters associated with a $195 million PIPE raised to support the acquisition of C M Grovesnor.. These fee estimates are also consistent with statistics cited by Doug Ellenoff of Ellenoff & Scholl, the leading SPAC-focused law firm.

and sponsor reputation. Interestingly, our estimates suggest that sponsor reputation, measured by the number of SPACs completed in the past, is not very informative of sponsors' agency cost, ℓ. Specifically, b_1 is estimated to be close to zero, and therefore, a reputable sponsor is not necessarily a sponsor who cares more about their shareholders. Reputable sponsors, however, are indeed better at finding established targets and targets with greater synergies. This finding is consistent with the superior ability and experience these sponsors bring to the SPAC market.

Our estimate of the deal completion function indicates that $c_0 = -1.35$ and $c_1 = -0.26$, implying that on average, de-SPACs complete with decent probability, but a high redemption rate δ and low external capital K can both reduce the likelihood.

Shareholders form expectations about de-SPAC returns by combining a linear projection based on deal terms and a private noisy signal. We estimate the weight placed on the private signal, χ, to be 0.27, indicating that private information plays a meaningful role in shaping shareholders' expectations and, in turn, their redemption decisions. This private signal varies across shareholders, and we estimate its standard deviation, σ_e, to be 0.29. This heterogeneity is essential for the model to match the observed distribution of redemption rates. A smaller σ_e would imply more homogeneous signals, leading to more uniform redemption behavior for a given SPAC and a polarized distribution of redemption rates across SPACs. In contrast, our estimate suggests that shareholder signals are generally noisy, a conclusion further supported by the realized de-SPAC returns.

Lastly, we estimate the sponsors' relative bargaining power, ρ, to be 0.52, suggesting that sponsors and target firms have nearly equal bargaining power. This estimate plays a crucial role in determining the value distribution in the de-SPAC process.

6 Model Implications

6.1 Value creation

The literature has painted a grim picture of SPACs, alleging that they destroy shareholder value on a massive scale. Using our estimated model as a laboratory, we quantify the value implications of SPACs and examine how this value is distributed among different players in the market. We focus on analyzing the social welfare implications of

SPACs and the contractual frictions embedded in their structure.

We begin by measuring the total value created or destroyed in de-SPAC transactions. This is captured by z, averaging across all targets taken public through SPAC mergers.[15] Our estimation recovers the distribution of z for all private firms available to SPACs, with de-SPACed targets being a selected subgroup of them. Figure 4 depicts the distribution of z for all private firms and for the group of de-SPACed targets, respectively.

We observe that the quality of private firms available to SPACs spans a wide spectrum, with a sizeable fraction of firms having negative z. These private firms, if taken public, would destroy value. However, the quality of de-SPACed targets differs significantly, with almost all targets having a positive z. The average z across these targets equals 0.24, with a standard deviation of 0.15. This finding suggests that value creation in de-SPAC transactions is substantial, amounting to about 24% of the standalone value of the private targets. This estimate is consistent with the magnitude of valuation discount resulting from marketability restrictions documented in Longstaff (1995). Though our estimate cannot directly pinpoint the driving forces of this value creation, it is attributable to several factors discussed in the literature. First, private targets often have low standalone values pre-listing due to their limited access to capital. Their private status typically restricts their ability to secure sufficient financing for expansion and growth. Second, many of these firms may have limited options for going public via traditional IPO. Thus, SPACs may provide a unique opportunity for these companies to access public markets and overcome financing constraints. This transition from a capital-constrained private entity to a publicly-traded company with enhanced growth prospects likely accounts for the significant value creation that we document.

Figure 4 also reveals the pivotal role of sponsors in SPACs. Despite the highly dispersed quality of private firms, sponsors are able to home in on the group of potential targets that can create value. This finding is supported by the arduous search process that most SPAC sponsors undertake, as detailed in proxy statements (DEFM 14A) filed in advance of business combinations. For instance, in the proxy statement filed by Harmony Acquisition in connection with its acquisition of NextDecade, Harmony states that they

[15] The value creation equals $z \cdot u$ in dollar terms. The convention in the literature is to express it in terms of target pre-merger market value, u, and thus the percentage gain equals z.

"identified and reviewed information with respect to *over 110 private companies*, from which it entered into substantial discussions with 25 companies. Harmony ultimately issued 14 letters of intent, but eventually settled on a deal with NextDecade." Similarly, Gores, in the proxy associated with its acquisition of TWNK (Hostess), "considered and conducted an analysis of over 40 potential acquisition targets...ultimately engaged in detailed discussions, due diligence and negotiations with 8 target businesses or their representatives, entering into non-disclosure agreements with 7 of those eight potential acquisition targets". Interested readers can find additional detail on these processes in Online Appendix C.

Our evidence of significant value creation stands in sharp contrast to the prevalent notion that SPAC sponsors frequently push through bad deals. Instead we suggest that such a notion requires careful reconsideration, particularly in how "bad deals" are defined. We explore this apparent contradiction from two angles in the ensuing discussion.

First, total value creation in de-SPAC transactions is not equivalent to returns to non-redeeming shareholders. From a social planner's perspective, SPACs that create positive value are still value-enhancing, even if some shareholders are harmed. In other words, deals that are unfavorable for some shareholders are not necessarily bad for the economy as a whole if we consider the welfare of other participants. SPACs are not inherently detrimental; they have the potential to create value in the financial markets. Policies aimed at regulating the SPAC market should focus on mitigating contractual frictions that distort value distribution among participants, rather than raising the barriers to SPAC creation. This aligns with recent theoretical work highlighting the unique advantages of SPACs in bringing private firms public when compared with traditional IPOs (e.g., Gryglewicz et al., 2022; Bai et al., 2021; Alti and Cohn, 2022).

Second, the SPAC market's impact on shareholder returns warrants careful investigation. Our estimated model predicts an average return of -7.3% to non-redeeming shareholders, close to the -9% observed in the data. Similar findings are often cited as definitive evidence that SPACs destroy value. However, redeeming shareholders always earn the risk-free rate by construction. Thus, the overall shareholder experience with SPACs is likely to be impacted by redemption decisions, especially when said decisions are informed.

To address this issue, we compute the returns to all shareholders as follows, taking into account both redeeming and non-redeeming shareholders' returns:

$$R_{all} = (1-\delta) \cdot R_{sh} + \delta \cdot r_f \tag{20}$$

with R_{all} being the return to all shareholders, R_{sh} the de-SPAC return earned by non-redeeming shareholders, and r_f is the risk-free rate earned by redeeming shareholders.

To highlight the importance of this distinction, consider an example of two SPACs: SPAC 1, with $R_{sh,1} = -50\%$, $\delta_1 = 0.9$; and SPAC 2, with $R_{sh,2} = 10\%$, $\delta_2 = 0$ We normalize the risk-free rate r_f to be zero in the model and estimation, and thus the average return to non-redeeming shareholders and the average return to all shareholders across the two SPACs are:

$$\begin{aligned}
\bar{R}_{sh} &= \frac{1}{2}(R_{sh,1} + R_{sh,2}) = -20\% \\
\bar{R}_{all} &= \frac{1}{2}(R_{all,1} + R_{all,2}) \\
&= \frac{1}{2}\left[(1-\delta_1) \cdot R_{sh,1} + \delta_1 \cdot r_f + (1-\delta_2) \cdot R_{sh,2} + \delta_2 \cdot r_f\right] = 2.5\%
\end{aligned}$$

The striking discrepancy between the two return measures arises because the redemption rates and the de-SPAC returns are negatively correlated, both in the model and in the data. In deals that deliver poor returns to non-redeeming shareholders, a large fraction of shareholders are likely to withdraw their shares before the de-SPAC and recover their initial investment. We find that the model-implied return to all shareholders averages 3.85%, close to its empirical counterpart of 2.4%. This measure incorporates returns to all shareholders' (redeeming and non-redeeming) and is a more accurate reflection of the value SPACs create for them. In contrast, the average return for all non-redeeming shareholders across all deals is -9% in our sample. This striking difference highlights the critical role of the redemption rate when evaluating the welfare implications of SPACs.

Our analysis indicates that SPACs are value-enhancing for the economy. They create value by screening private firms and bringing public those that are likely to be more valuable as public companies. While SPACs appear to destroy value for non-redeeming shareholders, the overall return they deliver to society is significantly positive.

6.2 Value distribution

In this section, we analyze how the value created in SPACs is distributed among different participants and how this distribution is shaped by contractual frictions.

The total dollar value created in a de-SPAC is equal to $z \cdot u$. This value is distributed among different participants following the contractual structure of SPACs: the sponsor gains $\theta \cdot p$ through compensation; the target gains $n \cdot p - u$; non-redeeming shareholders gain $(1 - \delta) \cdot (p - 1)$; PIPE/FPA investors gain $K \cdot (p - 1)$; and warrant holders gain $w \cdot (p - 1.15) \cdot 1_{\{p \geq 1.15\}}$.[16]

We express each component above as a fraction of the total value created. In the full sample, about 26% of the value created is paid out to sponsors via their promote. Targets get about 61% of the surplus. Non-redeeming shareholders capture just 4.5% of the value created on average. This small amount results from two forces. First, the average redemption rate is high in our sample, and thus, the ownership by non-redeeming shareholders is relatively small. Second, contractual frictions lead to an unfavorable allocation to non-redeeming shareholders, reducing their gains from SPACs. The PIPE/FPA investors, on average, receive 7.6% of the surplus, and warrant holders capture the remaining 1.3%.

Conflicted sponsors have been criticized for jeopardizing shareholder welfare via contractual frictions. To evaluate the effects of these sponsor agency costs, we sort the cross-section of SPACs simulated from the model into quartiles based on the agency costs of their sponsors, ℓ. We then compute the distribution of value created for SPACs in the top- and bottom-quartile of agency costs. We find that among SPACs with low agency costs (bottom-quartile), targets capture only 17% of the surplus, while the gains allocated to non-redeeming shareholders and PIPE/FPA investors increase significantly to 18% and 27.7%, respectively. In contrast, among SPACs with high agency costs (top-quartile), targets capture 87% of surplus, while non-redeeming shareholders end up with losses that equal 3.8% of total surplus. In other words, non-redeeming shareholders subsidize targets in these transactions. This occurs because conflicted sponsors are willing to overpay targets in the name of maximizing their joint surplus.

[16] Warrants have a strike price of 11.5 dollars in the data, which is normalized to 1.15 in the model. $1_{\{p \geq 1.15\}}$ indicates that the warrants are in-the-money post de-SPAC.

6.3 Inference of deal quality

Information asymmetry between shareholders and sponsors/targets is an important feature of the SPAC market. Our model addresses this asymmetry by positing that shareholders cannot directly observe deal fundamentals and must infer deal quality based on three key factors: sponsor reputation, deal terms, and private signals. By estimating the model, we can determine how shareholders utilize these variables to form expectations and make redemption decisions. As we discussed in Section 5.1, shareholders' inference is often driven by counteracting forces, and our estimates reveal the dominant effects of these forces.

First, sponsor reputation is directly related to deal outcomes. SPACs with high-reputation sponsors are associated with higher value creation through greater z and larger u. Our estimate shows that z is about 10% higher in SPACs with high-reputation sponsors, compared with their low-reputation counterparts, and average u is more than three times larger for high-reputation sponsors. Consequently, shareholders are less likely to redeem their shares in SPACs led by high-reputation sponsors, reflecting their expectation of better deal quality and higher potential returns.

Second, deal terms provide crucial insight into deal fundamentals. Both the model and data suggest that sponsors forfeiting promote shares is a dubious sign of deal quality. In the estimated model, the average de-SPAC return is 4% lower in deals where sponsors forfeit at least some of their promote shares, compared to deals where sponsors retain their entire promote. As for the external capital raised through PIPE/FPA, K, the certification effect seems to dominate the financing effect, and thus a high K signals high deal quality. Our estimate suggests that, all else equal, the average de-SPAC return in deals with the top quartile K is 34% higher than that in deals with bottom quartile K. Regarding the fraction of shares allocated to targets, $\frac{n}{N}$, the distribution effect prevails over the synergy effect, and a larger offer made to the target foreshadows poor de-SPAC returns. Specifically, the average de-SPAC return in deals with the top quartile allocation $\frac{n}{N}$ is about 20% lower than that in deals with the bottom quartile allocation.

Third, our estimate suggests that shareholders indeed utilize private signals, beyond the observable variables mentioned above, to infer deal quality and make redemption decisions. Despite the noisy nature of these signals, shareholders place about one-quarter of their decision weight on this information. This finding underscores the importance of individual investor research and due diligence in the SPAC process. Shareholders with more positive private signals are less likely to redeem their shares, while those with negative signals are more inclined to redeem, reflecting the diverse information set and interpretations among the investor base, leading to a non-polarized redemption rate.

In summary, our analysis reveals that shareholders rely on a combination of sponsor reputation, deal terms, and private signals to assess SPAC deal quality and make redemption decisions. Figure 5 illustrates shareholders' inference of de-SPAC returns compared to the actual returns. We simulate SPACs from the estimated model, plotting shareholders' inferred returns on the x-axis, against the true de-SPAC returns on the y-axis. Each point represents a simulated deal, with the 45-degree line indicating perfect inference. The figure reveals a strong positive correlation between shareholders' inference and true de-SPAC returns, demonstrating that shareholder judgment is indeed informative. However, the dispersion of points around the 45-degree line also indicates that these inferences are imperfect and often contain errors.

7 Policy Experiments

Our analysis has demonstrated that while SPACs possess significant value-creation potential, they often deliver negative returns to non-redeeming shareholders. This apparent contradiction is driven by the incentive conflicts of SPAC sponsors. Our findings provide compelling evidence of these conflicts. In response to these issues, the SEC proposed policy changes purportedly aimed at addressing the sponsor-investor conflict of interest and reducing information asymmetry in the SPAC process (SEC, proposed on March 30, 2022, implemented in 2024). In this section, we use our estimated model to explore whether such regulatory changes can mitigate these contractual frictions, which is critical for restoring stability and investor confidence in the SPAC market.

7.1 Sponsor Earnouts

A unique feature of SPACs, often accused of exacerbating agency problems, is that sponsor promote shares are contingent on deal completion rather than performance. As such, a deal that destroys shareholder value can still create lucrative payoffs for sponsors if pushed through. To mitigate this contractual friction, sponsor earnouts have been proposed as an innovative way to align sponsor and shareholder interests by tying sponsor promote shares to post-merger share price performance.[17]

Earnouts require that a SPAC's post de-SPAC share price reaches a specified threshold before the sponsor receives any associated shares. If the threshold is not met, the shares subject to the earnout are canceled. Typical thresholds are \$12.50 or \$15, requiring the share price to appreciate 25% or 50% relative to the IPO price. In a recent ruling (MPLN, 2022 WL 24060, Del. Ch., January 3, 2022), the Delaware Chancery Court suggested that tying the entire sponsor promote to earnouts might eliminate any apparent conflicts of interest.

Our first policy experiment involves tying a fraction, ψ, of the sponsor's promote to earnouts (with trigger price of \$12.50 and a maturity of 12 months).[18] For instance, if $\psi = 0.4$, then 0.1 of the sponsor's 0.25 promote shares will be tied to an earnout ($0.1 = 0.25 \times 0.4$). In solving the model, we still allow the sponsor to forfeit his promote shares as in the baseline model, but we assume that he dooesn't alter his compensation tied to earnouts. We then vary the value of ψ and investigate how increasing the portion of sponsor promote tied to earnouts improves SPAC shareholders' welfare.

Panel A of Figure 6 shows the results. As ψ increases, the average return to non-redeeming shareholders rises monotonically. Quantitatively, for every 10% increase in the fraction of compensation tied to earnouts, the average return to non-redeeming SPAC shareholders increases by 1.8 percentage points. The average return to all shareholders, including those who redeemed their shares before de-SPAC, also improves as ψ increases, but the slope is flatter because redeeming shareholders always earn the risk-free rate, attenuating the effect on overall shareholder welfare. Our results suggest that tying sponsors' promote shares to earnouts indeed improves shareholders' welfare substantially. These findings are in line with the suggestions put forth in Klausner and Ohlrogge (2022),

[17] In fact, earnouts are fairly standard fare in traditional M&A deals involving private targets, specifically for the purpose of overcoming asymmetric information and agency problems (Cadman et al., 2014).

[18] The recent research by Klausner and Ohlrogge (2022) suggests that the current structure of earnouts has a minimal impact on mitigating agency costs in the standard SPAC structure due to their long maturity. To improve the efficacy of earnouts, Klausner and Ohlrogge (2022) propose reducing their maturity. Our policy experiment considers the impact of 12-month earnouts, aligning with our model's use of 12-month post-merger share prices to measure performance.

regarding the potential efficacy of using short-term earnouts.

To understand how earnouts improve shareholder returns, we compare the total value created and its distribution among participants in the baseline model ($\psi = 0$) with a counterfactual economy where $\psi = 1$. Panel B of Figure 6 illustrates our findings, with white bars representing the baseline model results and gray bars representing the counterfactual scenario.

Compared to the baseline case, shareholder gains — measured as the dollar value of surplus captured by all shareholders — increase by 0.057 in the counterfactual (recall that IPO proceeds are normalized to 1). This improvement stems from two sources. First, the total value created increases by approximately 0.047 when sponsor compensation is 100% tied to earnouts, aligning with the notion that earnouts mitigate sponsors' incentives to push through bad deals. However, this is insufficient to fully account for the increase in shareholder gains, partly due to the fact that the average SPAC is value-creating, even in the baseline case.

The pivotal factor is the reduction in sponsor compensation, which decreases by 0.184 from the baseline case to the counterfactual. This substantial reduction in sponsor compensation due to earnouts preserves more value for other participants. Consequently, shareholders, warrantholders, targets, and PIPE/FPA investors all gain in the counterfactual scenario. Thus, our findings suggest that sponsor earnouts, when implemented with short maturity, can substantially improve the welfare of SPAC shareholders.

7.2 Public warrants

Most SPAC units include warrants. Warrants are like call options in that they can be exercised and converted to shares if the post de-SPAC share price is above the strike price. However, unlike call options, when warrants are exercised, new shares are created, resulting in dilution to all other shareholders. Klausner et al. (2022) and Gahng et al. (2023) document that warrants are costly, because they dilute the combined firm's value when exercised, transferring wealth to warrant holders. This problem is exacerbated when redemptions are high. Both the SEC and commentators propose reducing the number of warrants issued in units, in the hope of curtailing the dilution caused by their presence.

Our baseline model includes warrants, and we use the empirical distribution of warrants in our estimation. To implement a policy experiment related to warrant issuance, we assume that existing SPACs cut back their use of warrants issued in their IPO by a fraction, ψ, in response to a regulatory change. For instance, if a SPAC issues 0.5 warrants per unit in the baseline model, then we assume it now issues $0.5(1-\psi)$ in this policy experiment. $\psi = 0$ nests the baseline case and $\psi = 1$ represents the case in which warrants are completely abandoned.

We examine how the returns to SPAC shareholders change as we gradually reduce the number of warrants by moving from $\psi = 0$ to $\psi = 1$. Panel A of Figure 7 depicts the trajectory. We observe that returns to non-redeeming shareholders and returns to all shareholders both increase as warrants are reduced, but the improvement appears substantially smaller than that obtained via the use of sponsor earnouts. In particular, we find that for every 10% reduction in the average amount of warrants issued, returns to non-redeeming shareholders increase by about 0.33%, and returns to all shareholders increase by 0.21%, a small fraction of what is achieved through sponsor earnouts (1.8%).

Panel B of Figure 7 further demonstrates the sources of shareholder gains by comparing the baseline case ($\psi = 0$) with the counterfactual case ($\psi = 1$). As expected, the reduction in warrants mitigates dilution and thus preserves more value in the combined firm. This benefit, however, is realized only in good deals when the post de-SPAC share price is above the strike. In bad deals, cutting back warrants has no impact on shareholder returns. For this reason, in the baseline model, the average surplus accrued to warrant holders is small, and therefore, eliminating warrants does little to enhance shareholder welfare. It has very limited power to curb agency costs or level the playing field for SPAC shareholders. Thus, reducing warrants has no impact on incentive alignment.

7.3 Disclosure

One obstacle SPAC shareholders face is opaque information. SPAC shareholders delegate due diligence and negotiation with the target to the sponsor, who is unlikely to disclose all information. In response, the SEC advocates more mandatory disclosure, as well as increased sponsor accountability. To evaluate the efficacy of such actions, we experiment with different levels of disclosure using our estimated model.

Our approach is to assume that disclosure improves the quality of shareholders' private signals. Recall that in the baseline model, each shareholder, i, observes a signal related to the true de-SPAC return, η_i, as shown in Equation 11. The variance of the residual, σ_e^2, determines the quality of the signal. In the baseline model, we estimate σ_e to be 0.29, implying a variance of $\sigma_e^2 = 0.084$. In this policy experiment, we gradually reduce the noise in the shareholders' signals by setting σ_e^2 to be a fraction, $1 - \psi$, of its baseline value (i.e., $\sigma_e^2 = 0.084(1 - \psi)$), and we vary ψ from 0 to 0.9. As ψ increases, the variance of the noise term scales down proportionally, mimicking the fallout from a more comprehensive disclosure. We refrain from increasing ψ to 1 because this degenerates to the case where shareholders become perfectly informed, and all shareholders redeem their shares in deals that generate negative returns to non-redeeming shareholders (and otherwise never redeem). As a result, returns to non-redeeming shareholders are undefined in these deals. Reducing σ_e^2 also impacts the weight shareholders place on the signal. Intuitively, as the precision of the signal improves, shareholders optimally put more weight on this signal and rely less on the public signals.

Panel A of Figure 8 shows the effect of enhancing disclosure on shareholder welfare. Interestingly, the effect is still quite small when σ_e^2 is reduced by half, with the positive effect of disclosure only kicking in as the reduction further increases beyond 60%, which we view as an unrealistic objective. When disclosure reduces σ_e^2 by 90%, returns to non-redeeming shareholders increase by 5.6%.

Panel B of Figure 8 illustrates the surplus captured by different participants when disclosure is maintained at the current level (baseline σ_e^2) and when disclosure reduces σ_e^2 by 90%. As expected, more disclosure increases the surplus captured by shareholders and PIPE/FPA investors, who benefit at the expense of sponsors and target owners. Overall, the impact on the distribution of surplus is less significant compared to enforcing earnouts, which more directly limit the value of compensation received by sponsors.

8 Conclusion

In this paper we provide novel insights into the economics of SPACs through a structural model that captures the strategic interactions among SPAC sponsors, SPAC shareholders, and target companies. We challenge the prevailing view that SPACs destroy value on a massive scale, instead providing a more nuanced view of the role of SPACs.

We show that SPACs, on average, create significant value for the economy by bringing (screening) high-potential targets to public markets, aligning with recent theoretical work suggesting that SPACs complement traditional IPOs by providing an alternative pathway to a public listing for firms with significant adverse selection risks. Furthermore, we demonstrate that focusing solely on returns to non-redeeming shareholders provides an incomplete picture of SPAC performance. By accounting for redemptions, in contrast to studies that only consider non-redeeming shareholders, we show that the average return across all SPAC shareholders is significantly positive. Yet, SPACs also face challenges.

The recent boom in SPAC IPOs was highly concentrated, and then followed by a significant slowdown. Many SPACs from this boom are still seeking targets, with a substantial fraction likely to fail (liquidate). Yet, SPAC shareholders are made whole in liquidations. Instead, it is SPAC sponsors who are potentially hit in these cases, losing their risk capital and promote stakes. Thus, a wave of liquidations would be more consistent with a purging of excess than an evisceration of shareholder wealth.

We argue that the broad perception of SPACs as fundamentally value-destructive is overly pessimistic. In contrast, we pinpoint the key frictions embedded in the SPAC structure and highlight their role in shaping SPAC outcomes, which skew in favor of sponsors and target owners and away from SPAC shareholders. We conduct policy experiments, via simulation, that evaluate the efficacy of different proposed regulatory interventions looking to curtail such excesses. We find that requiring SPAC sponsors to tie more of their promote shares to performance via earnouts is highly effective at aligning incentives and increasing returns to SPAC shareholders, whereas reducing the issuance of warrants or modestly enhancing disclosure have limited impact. Understanding these frictions and potential regulatory solutions is critical to guide the SPAC market toward a more stable long-run equilibrium.

A Tables and Graphs

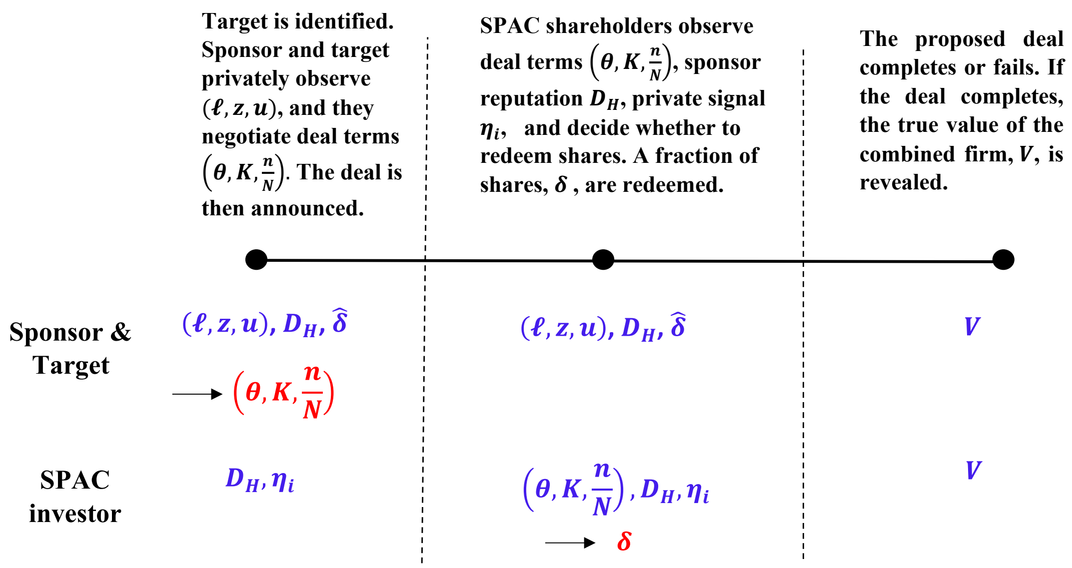


Figure 1. Model timeline.

This figure describes the timeline of the model. Variables in blue denote the information set of different agents, and variables in red denote their corresponding actions. The model contains three stages. In the first stage, the sponsor identifies a potential target firm, and they negotiate the deal terms. They observe the deal fundamentals, including the sponsor's agency cost (ℓ), value creation (z), and the target's reservation value as a private entity (u), and sponsor reputation D_H. With the anticipated SPAC shareholders' redemption rate $\hat{\delta}$, they choose the compensation accrued to the sponsor θ, the fraction of shares offered to the target $\frac{n}{N}$, and any additional capital to be raised externally K. In the second stage, the SPAC shareholders observe the deal terms (θ, K, $\frac{n}{N}$) and a private signal η_i, and they make individual redemption decisions that aggregate to the redemption rate δ. In the last stage, the true value of the combined firm V is revealed if the deal completes.

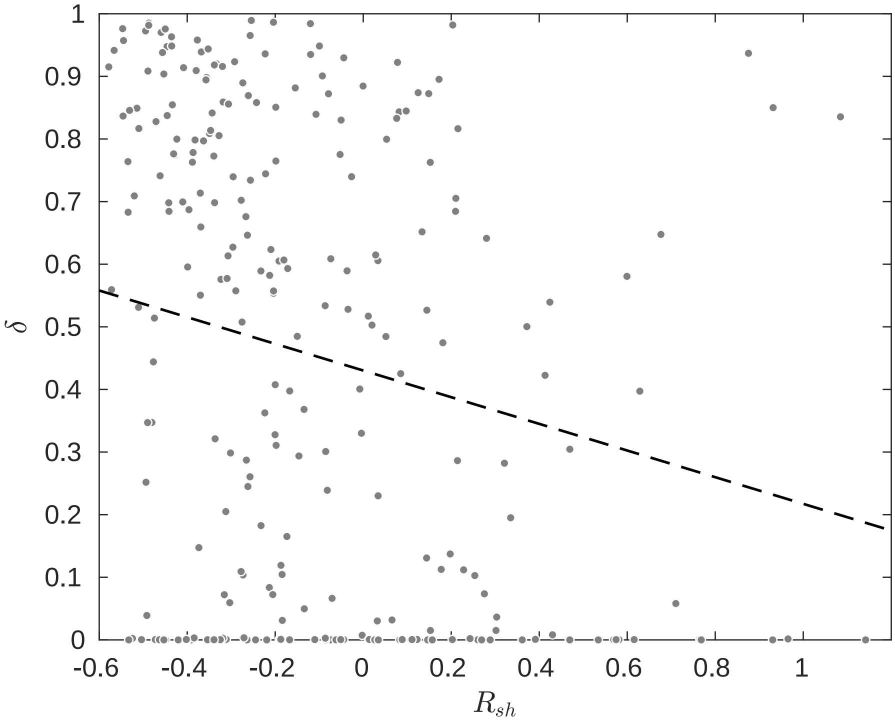


Figure 2. Redemption rate and returns to non-redeeming SPAC shareholders

This figure shows the relation between the aggregate redemption rate and returns to non-redeeming shareholders. Return to non-redeeming shareholders is measured as the share price 12 months post deal completion relative to the face value of the shares at IPO $10, benchmarked against the Renaissance IPO ETF (IPO). The scatter points represent individual deals and the dash line depicts the best fit of a linear relation between redemption and returns. There exists a significant, negative association between the redemption rate and return to non-redeeming shareholders in the data.

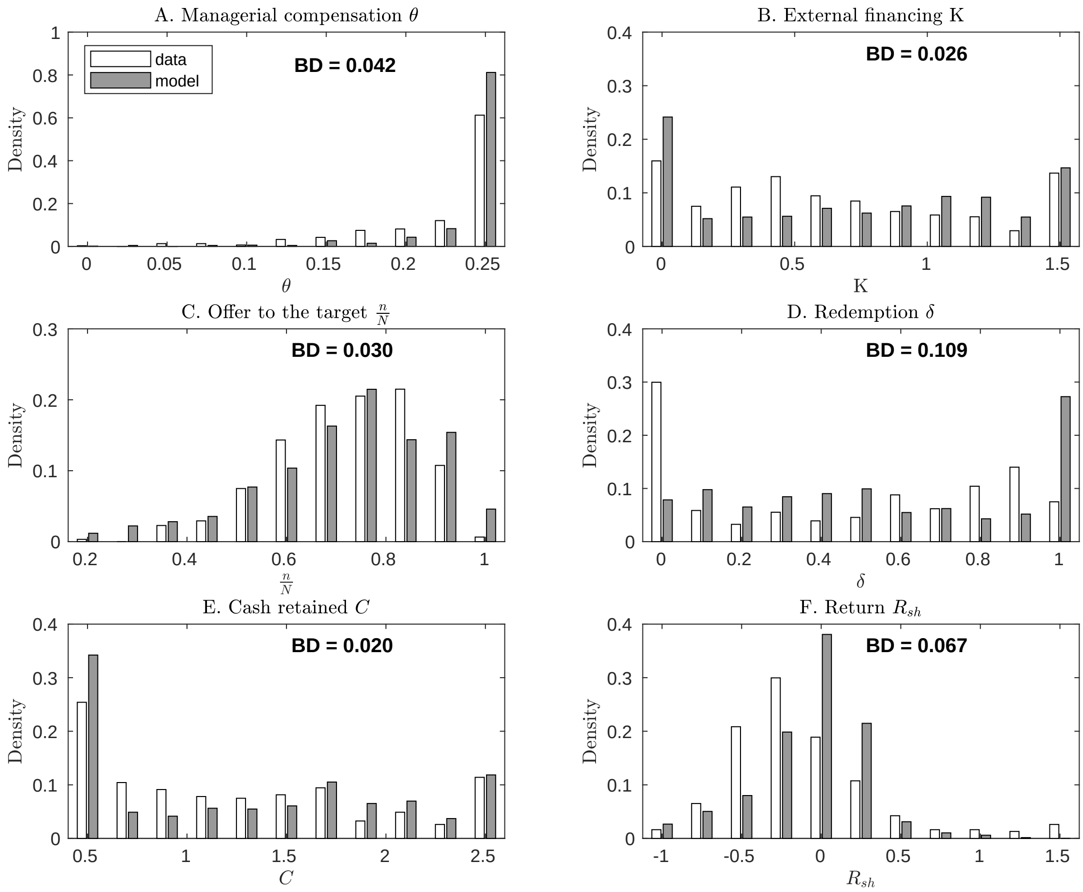


Figure 3. Model Fit on Variable Distributions

This figure illustrates the model fit on the distribution of observable variables. We compare the empirical distribution of a variable (plotted in white bars) with its model-implied distribution (plotted in gray bars). Panel A shows the comparison for the sponsor's compensation θ, panel B shows the distribution for external capital raised K, panel C shows the distribution for offers made to the target, expressed as a fraction of ownership in the combined firm $\frac{n}{N}$, panel D compares the distribution of redemption rate δ in the model and in the data, panel E shows the distribution of cash retained in the firm C, and panel F shows the return to SPAC shareholders R_{sh}. The Bhattacharyya Distance (BD) that gauges the similarity between the empirical distribution and the model-implied distribution is reported in each panel for the corresponding variable.

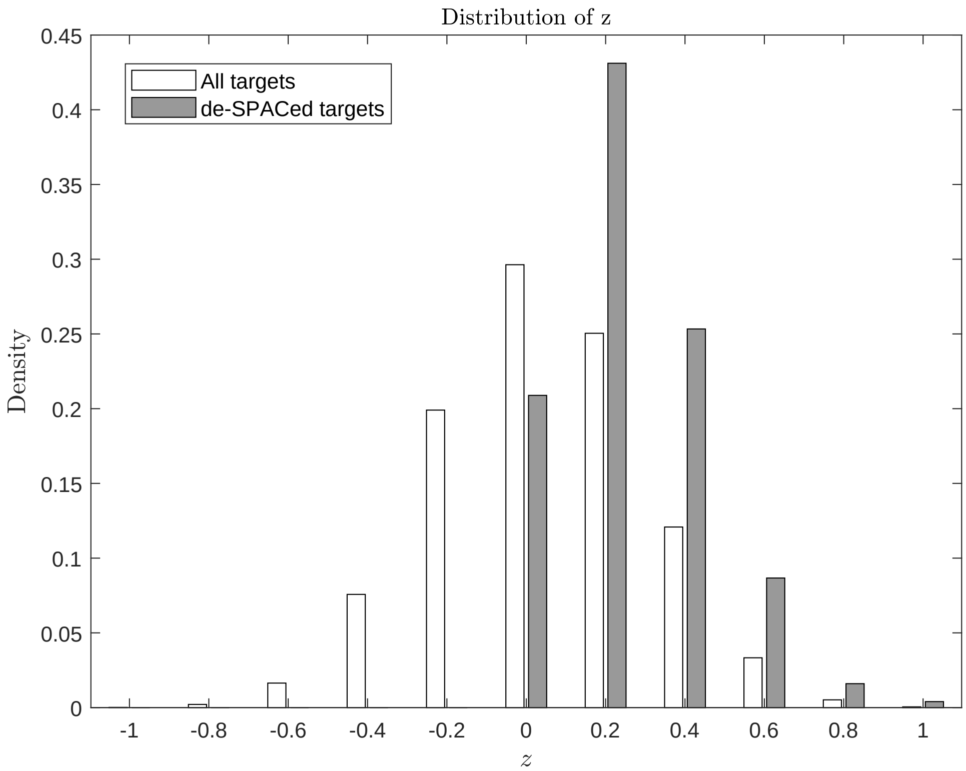


Figure 4. Value Creation by SPACs

This figure illustrates the estimated distribution of synergy z among private firms available to be merged with SPACs (white bars) and the estimated distribution of z among all de-SPACed targets (gray bars). SPACs play a pivotal role in screening private firms and bringing them public.

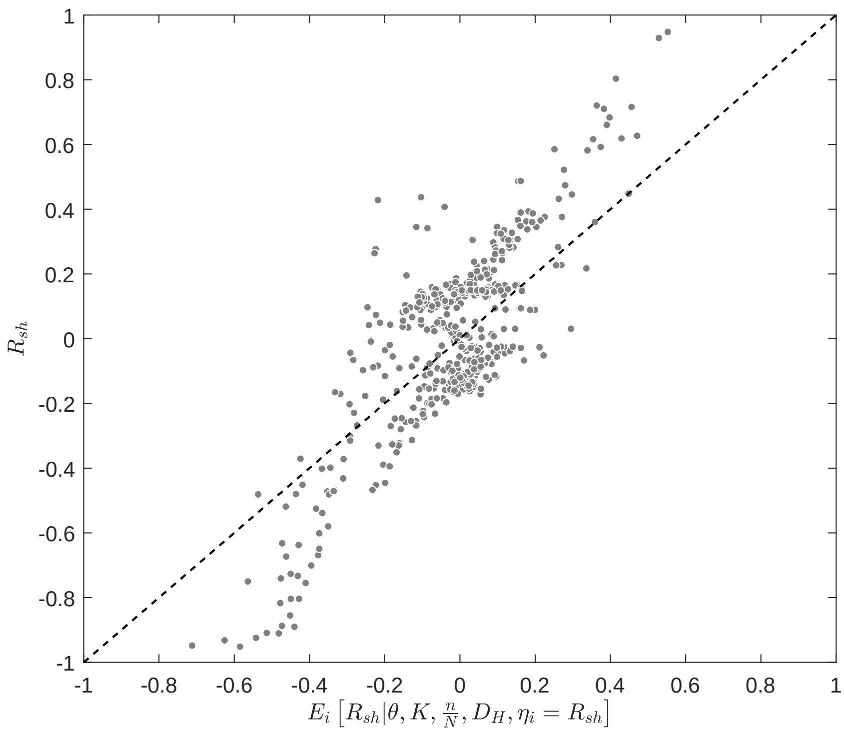
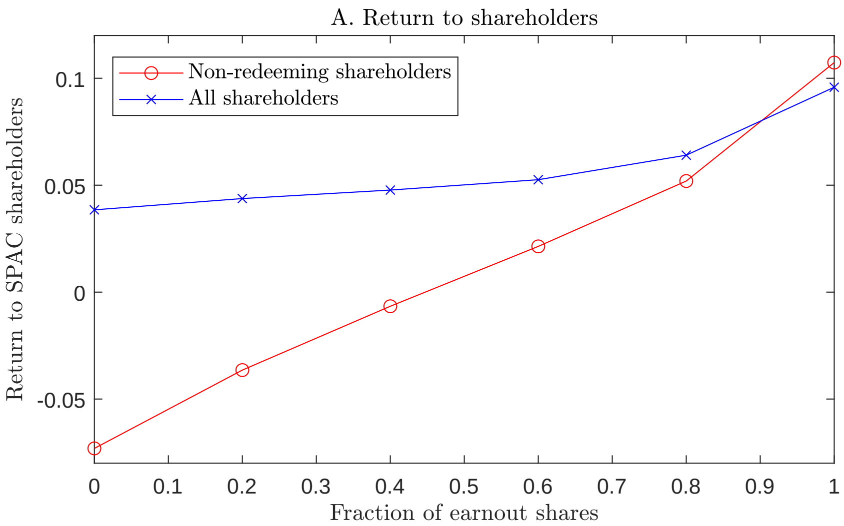


Figure 5. Forecast of deal returns: projection on deal terms and private signal

This figure depicts the forecast of de-SPAC returns by shareholders based on the combination of a linear projection on deal terms and private signals. The Y-axis represents the true return to shareholders in a given deal, R_{sh}, and X-axis represents the average forecast returns by shareholders, $\mathrm{E}_i\left[R_{sh}|\theta, K, \frac{n}{N}, D_H, \eta_i = R_{sh}\right]$. The dash line (45-degree line) represents the accurate forecast. We simulate the model and plot the simulation results in scattered points. A better forecast, or a more accurate expectation of deal returns, implies that the points cluster closely to the dash line.



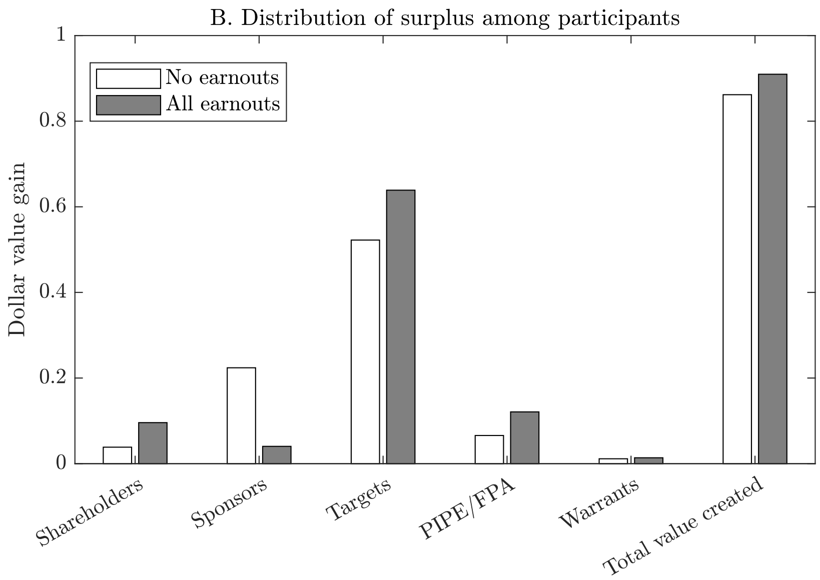


Figure 6. Policy experiment: sponsor earnouts

This figure illustrates the effects of a policy experiment that ties a certain fraction of sponsor compensation to earnouts. Panel A shows the effect of earnouts on returns to shareholders, with x-axis representing the fraction of sponsor compensation tied to earnouts and y-axis the average return to non-redeeming shareholders and all shareholders, respectively. Panel B shows the total value created in de-SPAC and the distribution of surplus among different participants.

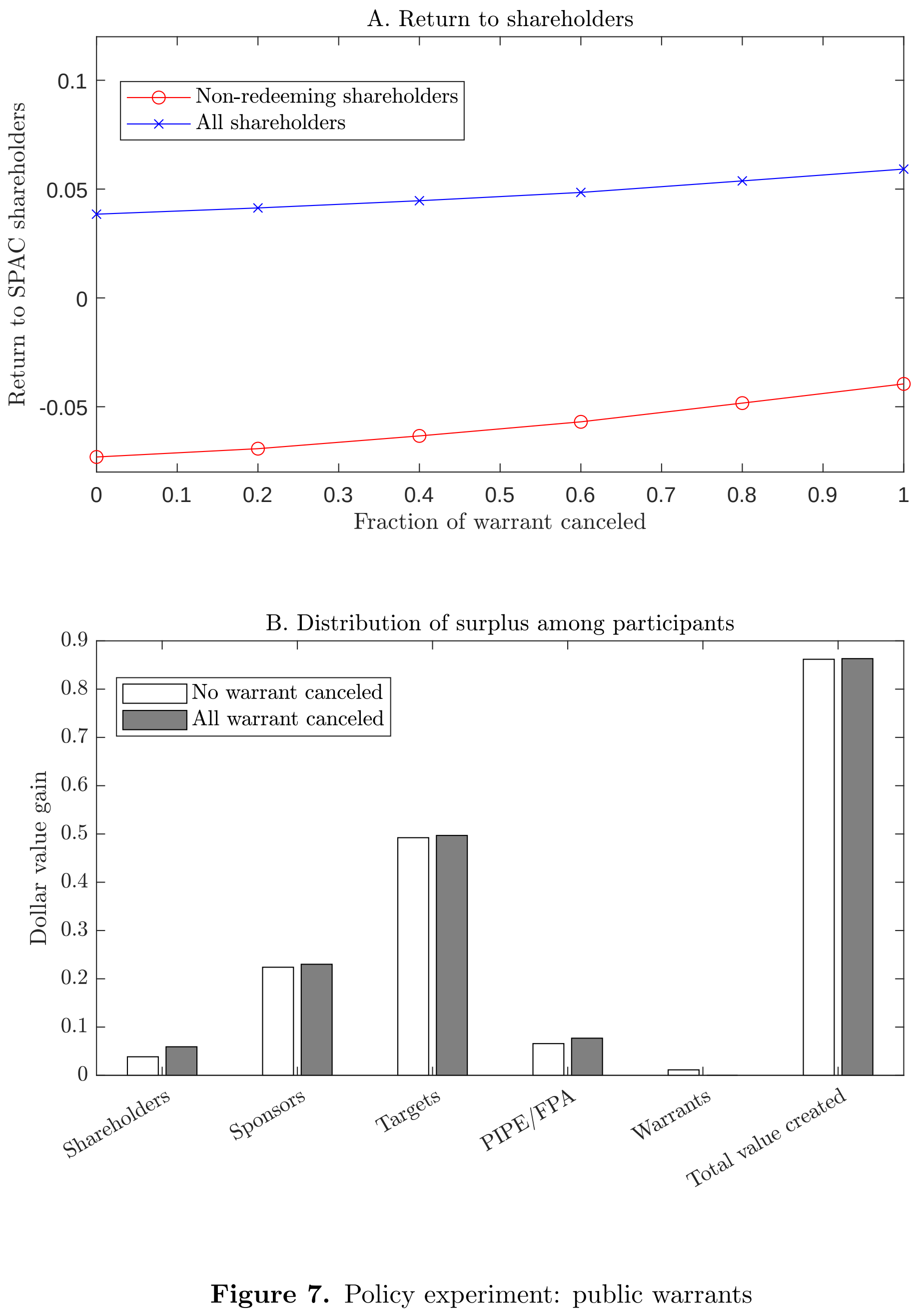


Figure 7. Policy experiment: public warrants

This figure illustrates the effects of a policy experiment that cuts back a certain fraction of public warrants issued in SPAC IPO. Panel A shows the effect of reducing warrants on returns to shareholders, with x-axis representing the fraction of warrants canceled and y-axis the average return to non-redeeming shareholders and all shareholders, respectively. Panel B shows the total value created in de-SPAC and the distribution of surplus among different participants.

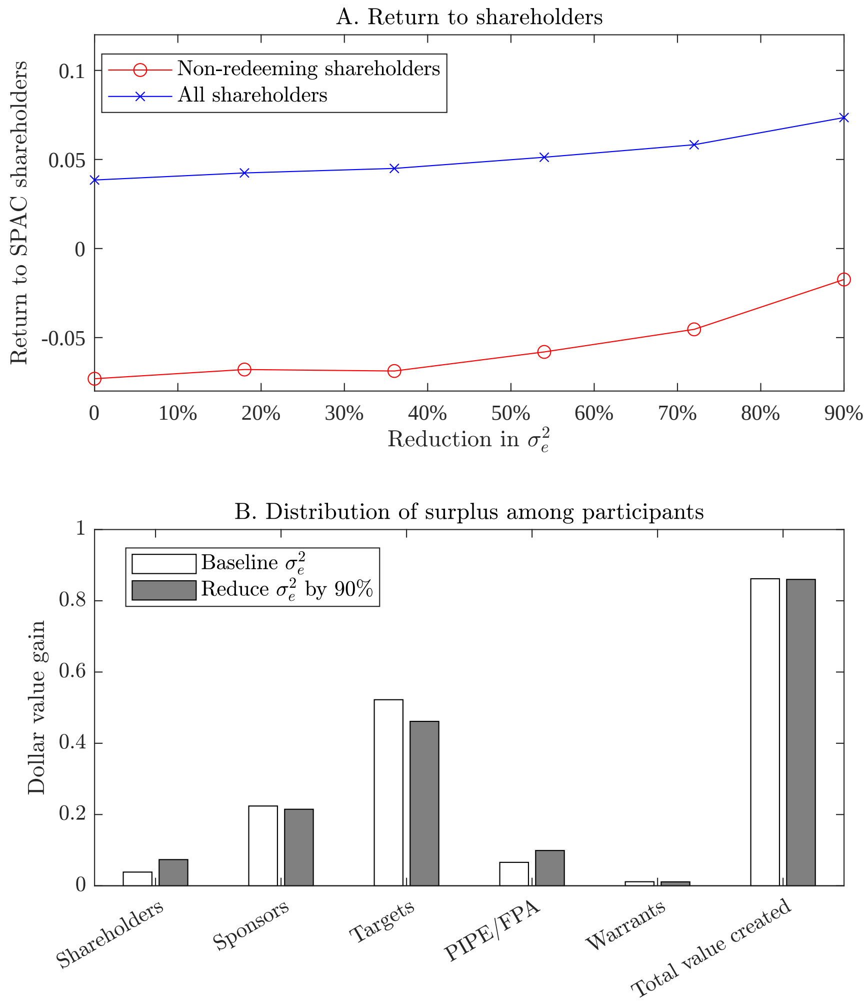


Figure 8. Policy experiment: disclosure

This figure illustrates the effects of a policy experiment that increases disclosure and thus improves the quality of shareholders' private signal. This policy generates two effects. First, it reduces σ_e^2 and renders the private signal less noisy and more homogeneous. Second, given a higher signal-to-noise ratio, shareholders adjust upward the weight they place on the private signal χ. Panel A shows the effect of increasing disclosure on returns to shareholders, with x-axis representing the percentage reduction in σ_e^2 and y-axis the average return to non-redeeming shareholders and all shareholders, respectively. Panel B shows the total value created in de-SPAC and the distribution of surplus among different participants.

Table 1. Summary Statistics

Panel A reports summary statistics for SPAC deals. Reported variables include SPAC IPO proceeds, which refers to the amount raised by SPACs in their IPOs, taking into account any exercise of the over-allotment option; Performance is measured as the 12-month post de-SPAC return relative to the baseline redemption price of 10 dollars, benchmarked against IPO (The Renaissance ETF that tracks an index composed of companies that have recently completed a public listing); Outside capital refers to any funds raised via unregistered equity sales and are used to supplement the SPAC's cash trust (e.g., PIPE, FPA); Total redemptions refer to the total number of shares redeemed by SPAC shareholders up to and including at the final up or down vote on the proposed business combination; Promote shares forfeited refers to the number of the sponsor's promote shares that he has offered to forfeit without compensation; Total consideration refers to the dollar value of consideration (sum of cash and shares) paid to target owners. Panel B reports a subset of the same characteristics of SPACs as in Panel A, but stated in terms relative to IPO shares sold. All variables are based on our final sample of 344 observations.

Panel A. SPAC Deal Characteristics

	Mean	Median	75th pctl	25th pctl	Std Dev	Non-Zero Avg.	Non-Zero Obs
IPO Proceeds (in millions of $s)	293	250	350	167	219	n/a	n/a
Performance (in %)	-9.02	-20.99	8.31	-40.84	58.86	n/a	n/a
Outside Capital (in millions of $s)	266	144	300	40	597	313	261
Total Redemptions (in millions of shares)	7.895	7.854	19.144	0.939	12.59	8.272	293
Promote Shares Forfeited (in millions of shares)	0.660	0	0.710	0	1.33	1.88	108
Total Consideration (in millions of $s)	1451.3	875.6	1540.3	380.0	2580.0	n/a	n/a

Panel B. Relative to IPO Cash/Shares

	Mean	Median	75th pctl	25th pctl	Std Dev
Outside Capital (as % of IPO Proceeds)	0.79	0.57	1.06	0.23	1.04
Redemption (% of IPO Shares)	0.45	0.51	0.83	0.003	0.37
Sponsor Compensation Retained (0.25 is Max)	0.22	0.25	0.25	0.21	0.05
Offer to Target (% of Total Shares)	0.72	0.74	0.83	0.63	0.14

Table 2. Model fit: empirical moments vs. model-implied moments

This table reports the model fit. The first column lists the 33 moments we target to match in the simulated method of moments (SMM), the second column provides the definition for each moment, and the third, fourth, and fifth columns show the empirical value, standard error of empirical value (S.E.), and model-implied counterparts, respectively.

Moment	Definition	Empirical value	S.E.	Simulated value
Mean($\ln(1+K)$)	Avg. external capital raised (in log)	0.493	0.022	0.506
Std($\ln(1+K)$)	Stdev. of external capital raised (in log)	0.386	0.025	0.377
Mean(δ)	Avg. redemption rate	0.450	0.021	0.563
Std(δ)	Stdev. of redemption rate	0.374	0.007	0.350
Mean(θ)	Avg. compensation to sponsor	0.222	0.003	0.238
Std(θ)	Stdev. of compensation to sponsor	0.046	0.003	0.032
Mean($\frac{n}{N}$)	Avg. fraction of the combined firm's shares offered to the target	0.720	0.008	0.719
Std($\frac{n}{N}$)	Stdev. of the fraction of the combined firm's shares offered to the target	0.141	0.006	0.176
Mean(R_{sh})	Avg. de-SPAC returns to shareholders	-0.090	0.034	-0.073
Std(R_{sh})	Stdev. of de-SPAC returns to shareholders	0.589	0.062	0.326
Frac($D_H = 1$)	The fraction of SPACs with high-reputation sponsors	0.059	0.030	0.065
$\theta(D_H = 1) - \theta(D_H = 0)$	Gap in sponsor compensation between high- and low-reputation sponsors	-0.012	0.033	0.004
$\frac{n}{N}(D_H = 1) - \frac{n}{N}(D_H = 0)$	Gap in target allocated share between high- and low-reputation sponsors	0.062	0.047	0.062
$R_{sh}(D_H = 1) - R_{sh}(D_H = 0)$	Gap in de-SPAC return between high- and low-reputation sponsors	0.306	0.056	0.346
Coef(R_{sh},$1_{\theta<0.25}$)	Loading of de-SPAC returns on sponsor compensation forfeit dummy in equation (16)	-0.059	0.043	-0.041
Coef(R_{sh},$Q_{K,2}$)	Loading of de-SPAC returns on external financing 2nd-quartile dummy in equation (16)	0.039	0.054	0.291
Coef(R_{sh},$Q_{K,3}$)	Loading of de-SPAC returns on external financing 3rd-quartile dummy in equation (16)	0.116	0.041	0.247
Coef(R_{sh},$Q_{K,4}$)	Loading of de-SPAC returns on external financing 4th-quartile dummy in equation (16)	0.168	0.132	0.338
Coef(R_{sh},$Q_{\frac{n}{N},2}$)	Loading of de-SPAC returns on target shares 2nd-quartile dummy in equation (16)	-0.084	0.016	-0.035
Coef(R_{sh},$Q_{\frac{n}{N},3}$)	Loading of de-SPAC returns on target shares 3rd-quartile dummy in equation (16)	-0.062	0.024	0.002
Coef(R_{sh},$Q_{\frac{n}{N},4}$)	Loading of de-SPAC returns on target shares 4th-quartile dummy in equation (16)	-0.119	0.023	-0.194
Coef(R_{sh},D_H)	Loading of de-SPAC returns on sponsor reputation dummy in equation (16)	0.201	0.025	0.220
Coef(δ,$1_{\theta<0.25}$)	Loading of redemption rate on sponsor compensation forfeit dummy in equation (17)	0.038	0.024	0.062
Coef(δ,$Q_{K,2}$)	Loading of redemption rate on external financing 2nd-quartile dummy in equation (17)	-0.001	0.025	-0.185
Coef(δ,$Q_{K,3}$)	Loading of redemption rate on external financing 3rd-quartile dummy in equation (17)	-0.064	0.022	-0.501
Coef(δ,$Q_{K,4}$)	Loading of redemption rate on external financing 4th-quartile dummy in equation (17)	-0.114	0.046	-0.698
Coef(δ,$Q_{\frac{n}{N},2}$)	Loading of redemption rate on target shares 2nd-quartile dummy in equation (17)	-0.010	0.111	0.059
Coef(δ,$Q_{\frac{n}{N},3}$)	Loading of redemption rate on target shares 3rd-quartile dummy in equation (17)	0.058	0.013	0.073
Coef(δ,$Q_{\frac{n}{N},4}$)	Loading of redemption rate on target shares 4th-quartile dummy in equation (17)	0.090	0.010	0.112
Coef(δ,D_H)	Loading of redemption rate on sponsor reputation dummy in equation (17)	-0.050	0.223	-0.256
Coef(ε_R,ε_δ)	Loading of return residual on redemption residual in equation (18)	-0.578	0.021	-0.598
Coef(R_{sh},δ)	Loading of de-SPAC return on redemption rate	-0.527	0.035	-0.577
Prob(suc)	Avg. probability of deal completion	0.848	0.090	0.847

Table 3. Parameter value estimation

This table reports the estimated model parameters. We search the value of parameters to minimize the distance between the empirical moments and the model-implied moments in SMM. The first column of the table lists the notation of parameters, the second column provides the definition of the parameters, and the third column reports the estimated parameter values.

Parameter	Definition	Value
μ_z	Avg. of deal quality $\ln(1+z)$	-0.04
σ_z	Stdev. of deal quality across deals $ln(1+z)$	0.26
μ_u	Avg. of $\ln(u)$, u is the target value as a private entity	0.91
σ_u	Stdev. of $\ln(u)$, u is the target value as a private entity	1.03
ϕ_1	The linear component of variable cost of raising external capital	0.013
ϕ_2	The quadratic component of variable cost of raising external capital	0.020
α	Parameter of Beta distribution $Beta(\alpha, \beta)$ for sponsor agency cost ℓ	1.02
β	Parameter of Beta distribution $Beta(\alpha, \beta)$ for sponsor agency cost ℓ	1.90
b_0	Constant term in the function of sponsor reputation in equation (9)	5.20
b_1	Coefficient of ℓ in the function of sponsor reputation in equation (9)	-0.01
b_2	Coefficient of z in the function of sponsor reputation in equation (9)	-0.28
b_3	Coefficient of u in the function of sponsor reputation in equation (9)	-0.41
c_0	Constant term in the function of deal completion rate in equation (13)	-1.35
c_1	Coefficient of cash deliverable in deal completion rate in equation (13)	-0.26
χ	Weight on shareholder private signals	0.274
σ_e	Dispersion of shareholder private signals	0.290
ρ	Sponsor relative bargaining power	0.520

References

Albuquerque, R. and E. Schroth (2010). Quantifying private benefits of control from a structural model of block trades. *Journal of Financial Economics 96*(1), 33–55.

Albuquerque, R. and E. Schroth (2015). The value of control and the costs of illiquidity. *Journal of Finance 70*(4), 1405–1455.

Alti, A. and J. B. Cohn (2022). A model of informed intermediation in the market for going public. *Available at SSRN 4058787*.

Bai, J., A. Ma, and M. Zheng (2021). Segmented going-public markets and the demand for SPACs. *Available at SSRN 3746490*.

Banerjee, S. and M. Szydlowski (2024). Harnessing the overconfidence of the crowd: A theory of SPACs. *Journal of Financial Economics 153*, 103787.

Bazdresch, S., R. J. Kahn, and T. M. Whited (2018). Estimating and testing dynamic corporate finance models. *Review of Financial Studies 31*(1), 322–361.

Bessler, W. and T. Nohel (2025). Sponsor Reputation and the Structure of SPAC Units. *Available at SSRN 5140291*.

Blomkvist, M. and M. Vulanovic (2020). SPAC IPO waves. *Economics Letters 197*, 109645.

Cadman, B., R. Carrizosa, and L. Faurel (2014). Economic Determinants and Information Environment Effects of Earnouts: New Insights from SFAS 141(R). *Journal of Accounting Research 52*, 37–74.

Celik, M. A., X. Tian, and W. Wang (2022). Acquiring innovation under information frictions. *Review of Financial Studies 35*(10), 4474–4517.

Chatterjee, S., N. Chidambaran, and G. Goswami (2016). Security design for a non-standard IPO: The case of SPACs. *Journal of International Money and Finance 69*, 151–178.

Cox, J. C., S. A. Ross, and M. Rubinstein (1979). Option pricing: A simplified approach. *Journal of Financial Economics 7*(3), 229–263.

Cumming, D., L. H. Haß, and D. Schweizer (2014). The fast track IPO–Success factors for taking firms public with SPACs. *Journal of Banking & Finance 47*, 198–213.

Dambra, M., O. Even-Tov, and K. George (2023). Are SPAC Revenue Forecasts Informative. *The Accounting Review 98*(7), 121–152.

Dimitrova, L. (2017). Perverse incentives of special purpose acquisition companies, the "poor man's private equity funds". *Journal of Accounting and Economics 63*(1), 99–120.

Gahng, M., J. R. Ritter, and D. Zhang (2023). SPACs. *Review of Financial Studies 36*(9), 3463–3501.

Gantchev, N. (2013). The costs of shareholder activism: Evidence from a sequential decision model. *Journal of Financial Economics 107*(3), 610–631.

Gofman, M. and Y. Yao (2022). Spacs' directors network: Conflicts of interest, compensation, and competition. *Available at SSRN 4148668*.

Gryglewicz, S., B. Hartman-Glaser, and S. Mayer (2022). PE for the Public: The Rise of SPACs. *Available at SSRN 3947368*.

Jenkinson, T. and M. Sousa (2011). Why SPAC investors should listen to the market. *Journal of Applied Finance 21*(2).

Kang, A. and R. Lowery (2014). The pricing of ipo services and issues: Theory and estimation. *Review of Corporate Finance Studies 2*(2), 188–234.

Klausner, M. and M. Ohlrogge (2022). Is SPAC Sponsor Compensation Evolving? A Sober Look at Earnouts. *Available at SSRN 4022611*.

Klausner, M., M. Ohlrogge, and E. Ruan (2022). A sober look at SPACs. *Yale Journal on Regulation 39*, 228.

Kolb, J. and T. Tykvova (2016). Going public via special purpose acquisition companies: Frogs do not turn into princes. *Journal of Corporate Finance 40*, 80–96.

Lewellen, S. (2009). SPACs as an asset class. *Available at SSRN 1284999*.

Lin, C., F. Lu, R. Michaely, and S. Qin (2021). SPAC IPOs and sponsor network centrality. *Available at SSRN 3856181*.

Longstaff, F. A. (1995). How much can marketability affect security values? *The Journal of Finance 50*(5), 1767–1774.

Luo, D. and J. Sun (2022). A dynamic delegated investment model of SPACs. *Available at SSRN 3929762*.

Rodrigues, U. and M. Stegemoller (2014). What all-cash companies tell us about IPOs and acquisitions. *Journal of Corporate Finance 29*, 111–121.

Wang, W. and Y. Wu (2020). Managerial control benefits and takeover market efficiency. *Journal of Financial Economics 136*(3), 857–878.

Appendix

A Numerical Algorithm

To solve the model numerically, we first discretize the deal fundamental (ℓ, z, u) into grids of size N_ℓ, N_z, and N_u, respectively. Sponsor reputation is specified as a dummy variable on the binary grids. We then discretize the policy functions $(\theta, K, \frac{n}{N})$ into grids of size $N_\theta, N_K, N_{\frac{n}{N}}$. To start the iteration, we initialize shareholders' projection coefficients a_0 to a_4 in Equation 10 to be $A^{(0)} = \{a_0^{(0)}, a_1^{(0)}, a_2^{(0)}, a_3^{(0)}, a_4^{(0)}\}$.

We follow the steps below in each iteration $g \geq 1$:

1. Given the projection coefficients obtained in iteration $g-1$, $A^{(g-1)}$, for each grid on the deal fundamental (ℓ, z, u) and sponsor reputation D_H, we first compute the expected redemption rate δ based on Equation 15. This step requires a fixed point algorithm, because R_{sh} in Equation 15 is a function that also depends on δ. Specifically,

   (a) We start with an initial guess of $\delta = 0.5$, and for each point on the grids of deal terms, $(\theta, K, \frac{n}{N})$, we can compute R_{sh} from Equation 5;

   (b) We then update δ using Equation 15, given the deal fundamental (ℓ, z, u), sponsor reputation D_H, and R_{sh};

   (c) If the distance between the updated δ and the δ from last iteration is greater than a predetermined cutoff Δ_δ, we repeat the two steps above until convergence.

   Upon convergence, we obtain the expected redemption rate δ as a function of deal fundamental (ℓ, z, u), sponsor reputation D_H, and deal terms choice $(\theta, K, \frac{n}{N})$.

2. We then solve the sponsor's and target's optimal choice of deal terms. Specifically, for each point on the grids of deal fundamental (ℓ, z, u) and reputation D_H, we search for the point $(\theta^{(g)}, K^{(g)}, \frac{n}{N}^{(g)})$ that maximizes the joint surplus of the sponsor and target, as in Equation 14. This also pins down the corresponding redemption rate $\delta^{(g)}$ associated with the chosen deal terms.

3. We simulate a cross-section of SPACs by drawing from the distribution of deal fundamental (ℓ, z, u) and sponsor reputation D_H, and we obtain the optimal deal terms $(\theta, K, \frac{n}{N})$ and the redemption rate δ. With this set of information, we are able to compute the realized de-SPAC return R_{sh} for each SPAC, and we perform the OLS regression, as in Equation 10, to update the projection coefficients $A^{(g)} = \{a_0^{(g)}, a_1^{(g)}, a_2^{(g)}, a_3^{(g)}, a_4^{(g)}\}$.

4. We compute the distance between $A^{(g)}$ and $A^{(g-1)}$, and repeat step 1 to 3 above until the distance between the last two iterations falls below a predetermined cutoff Δ_A.

The above numerical algorithm solves the model for a given set of model parameters. To perform SMM estimation, we simulate a cross-section of SPAC deals, and compute the aggregate moments from them. We then compare the model-implied moments with the data moments to evaluate the model's fit. We search for the model parameters that minimize the distance between the model-implied moments and the data moments.

B Robustness Checks

In this section, we conduct robustness checks to validate our baseline results. Specifically, we explore two alternative measures of sponsor reputation and examine how the effect of cash deliverable on deal completion varies across different target firms.

B.1 Alternative Measures of Sponsor Reputation

In our baseline model, we define SPAC sponsor reputation based on their prior experience with de-SPAC transactions. A sponsor is classified as "high-reputation" if they completed at least three de-SPAC transactions before forming the current SPAC and "low-reputation" otherwise. This classification is motivated by standard practice in the investment banking industry, where reputation is often measured by deal volume or value. For instance, league tables rank banks based on their activity in M&A advisory, IPO underwriting, debt issuance, and loan syndication.

While past deal volume or value is a common metric for reputation, SPAC investors may also consider other factors, such as the financial performance of past deals or the sponsor's professional background. To capture these additional dimensions, we introduce alternative reputation measures.

The first alternative measure classifies sponsors based on the performance of their prior de-SPAC transactions. A sponsor is considered "high-reputation" if he delivered benchmark-adjusted returns to non-redeeming shareholders in the upper quartile of all SPACs in at least one prior de-SPAC transaction."[19]

According to this classification, approximately 15% of sponsors in our sample are considered high-reputation at the time of forming their SPACs. We reestimate the model using this alternative reputation measure. In the model, sponsor reputation correlates with deal fundamentals – including the agency cost ℓ, deal synergy z, and target standalone value u – through Equation 9. The key parameters governing these correlations are b_0 through b_3. Section 5.1 identifies the moments that are most informative for estimating these parameters: the fraction of high-reputation sponsors, the promote shares forfeited by high- vs. low-reputation sponsors, the de-SPAC returns delivered by high- vs. low-reputation sponsors, and the offers made to targets by high- vs. low-reputation sponsors. Our estimation results confirm this mapping, showing that most other parameters and model-implied moments remain largely unchanged in the reestimation.

Table B.1 presents the results. Panel A demonstrates the model fit of the key moments that identify the parameters related to sponsor reputation. Columns 1–2 display the baseline estimation results, while Columns 3–4 present the results using sponsor reputation measured by the performance of past de-SPAC transactions. Under the new reputation measure, a larger fraction of sponsors are classified as high-reputation compared to the baseline (15% vs. 6%). Sponsor reputation still does not correlate with the number of promote shares forfeited but remains a strong predictor of de-SPAC returns. High-reputation sponsors, on average, deliver significantly better returns to non-redeeming shareholders under both reputation measures. However, unlike the baseline reputation

[19] Sponsors with no prior de-SPAC experience are categorized as low-reputation. For the purpose of defining reputation, we measure de-SPAC returns over a three-month horizon, as most of our observations fall between 2020 and 2021. Extending the measurement window to 12 months would significantly reduce the number of available observations for classification. However, once sponsors are classified, we continue to measure de-SPAC returns using the 12-month horizon in our estimation, consistent with the baseline model.

measure – which predicts greater ownership by the target, often implying larger targets identified by sponsors – the new measure does not appear to correlate with the ownership stake of the target in the combined firm.

These empirical patterns influence the estimated parameters. The value of b_0 decreases to accommodate the larger fraction of high-reputation sponsors. The correlation between this new reputation measure and deal synergy remains significantly positive, as indicated by the negative estimate of b_2 in Equation 9. The point estimates of b_2 and b_3 are, however, slightly attenuated compared with their counterparts in the baseline.

The second alternative reputation measure we construct is based on the professional background of sponsors. Since SPAC sponsors are delegated with the responsibility of evaluating targets, securing external financing, and negotiating deal terms, it is often believed that sponsors with venture capital or private equity working experience have advantages in delivering better outcomes for SPAC investors. For this reason, we classify sponsors with such career paths as high reputation. According to this classification, approximately 45% of sponsors in our sample are considered high-reputation at the time of forming their SPACs. We reestimate the model using this alternative reputation measure, and report the results in Table B.1, contrasting them with the baseline results and the results with reputation measured by past deal performance.

Specifically, Column 5 and 6 in Panel A of Table B.1 shows that this reputation measure also strongly predicts de-SPAC returns, with high-reputation sponsors delivering an average de-SPAC return that is 20 percentage-points higher than that by low-reputation sponsors. Like the performance-based reputation measure, this background-based reputation measure does not seem to strongly correlate with promote shares forfeited or target ownership in the combined firm, as both empirical moments are economically small and statistically insignificant.

Panel B confirms that the parameter estimates governing the relationship between sponsor reputation and deal fundamentals, b_1 to b_3, remain largely stable despite the attenuation of their corresponding empirical moments. At first glance, one might expect the estimates of b_1 through b_3 to also decline in response to this attenuation. However, a key insight from the logistic function structure explains why they remain largely unchanged. As b_0 decreases to accommodate the larger fraction of high-reputation sponsors, the marginal effects of ℓ, z, and u strengthen even with b_1 to b_3 held constant. This occurs because, in a logistic model, the gap in deal fundamentals required to generate a given difference in reputation classification (high vs. low) shrinks as b_0 declines. In other words, a lower b_0 compresses the implied spread in deal fundamentals between high- and low-reputation sponsors, explaining why the estimates of b_1 through b_3 remain stable despite the observed attenuation in empirical moments.[20]

Overall, the alternative measures of sponsor reputation yield results consistent with our baseline estimation. Although the fraction of sponsors classified as high-reputation

[20] This intuition can be formally illustrated using the logistic function $y = 1/(1 + e^{b_0+b_1x_1+b_2x_2+b_3x_3})$. The derivative $\frac{dx_i}{dy}$, which measures how changes in reputation classification y translate into gaps in deal fundamentals x_i, is given by:

$$\frac{dx_i}{dy} = -\frac{(1 + e^{b_0+b_1x_1+b_2x_2+b_3x_3})^2}{b_i e^{b_0+b_1x+b_2x_2+b_3x_3}}.$$

The magnitude of $\frac{dx_i}{dy}$ decreases as b_0 decreases. This means that for a given difference in y (the classification of sponsors as high- vs. low-reputation), the corresponding difference in x_i (deal fundamentals) is smaller when b_0 is lower. As a result, even though the empirical moments associated with b_1 through b_3 are attenuated, their estimates remain largely unchanged because the model naturally compensates by shrinking the implied gap in deal fundamentals.

varies significantly across different measures, all effectively capture the strong correlation between sponsor reputation and deal synergies. Among the three, the baseline reputation measure sets the most stringent criteria for high-reputation sponsors and proves to be the most effective in predicting target quality and deal synergies.

Table B.1. Alternative Reputation Measures

This table presents the model fit (Panel A) and parameter estimates (Panel B) for three alternative specifications: the baseline model, a model with performance-based reputation, and a model with background-based reputation. Panel A compares empirical moments from the data against their model-generated counterparts. Panel B reports the estimated structural parameters under each specification.

Panel A. Fit of Identifying Moments

	Baseline		Performance Reputation		Background Reputation	
Moments	**Data**	**Model**	**Data**	**Model**	**Data**	**Model**
Frac($D_H = 1$)	0.059	0.065	0.150	0.156	0.450	0.430
$\theta(D_H = 1) - \theta(D_H = 0)$	-0.012	0.004	-0.001	0.008	0.000	0.017
$R_{sh}(D_H = 1) - R_{sh}(D_H = 0)$	0.306	0.346	0.176	0.174	0.205	0.205
$\frac{n}{N}(D_H = 1) - \frac{n}{N}(D_H = 0)$	0.062	0.062	-0.013	0.029	-0.025	-0.021

Panel B. Estimates of Model Parameters

Parameter	Baseline	Performance Reputation	Background Reputation
b_0	5.20	2.96	1.81
b_1	-0.01	0.02	-0.02
b_2	-0.28	-0.18	-0.27
b_3	-0.41	-0.26	-0.40

B.2 Deal Completion Rate and Target Size

In our baseline model, the probability of deal completion depends on cash deliverable, which in turn depends on shareholder redemption and external capital raised through PIPE or FRA. As Equation 13 implies, the sensitivity of deal completion w.r.t. cash deliverable, captured by the coefficient c_1, is assumed to be constant across all de-SPAC transactions. In this section, we examine possible heterogeneity in this sensitivity across targets of different sizes. To do so, we enrich the specification in Equation 13 as:

$$q = \frac{1}{1 + e^{c_0 + c_1 \cdot (1-\delta+K) + c_2 \cdot ln(u) \cdot (1-\delta+K)}}$$

where the parameter c_2 is the coefficient associated with the interaction term between the target's standalone size, $ln(u)$, and the cash deliverable, $1 - \delta + K$. A negative value of c_2 would imply that the deal completion rate is more sensitive to cash deliverable for large targets, while a positive value of c_2 would imply that the sensitivity is muted for large targets.

In order to identify the new parameter c_2, we extend the moments we use in SMM. In the baseline model, we regress de-SPAC returns on deal terms and sponsor reputation and include the regression coefficients in SMM as part of the targeted moments:

$$\begin{aligned}R_{sh} &= \lambda_0 + \lambda_X \cdot X + \varepsilon_R \\ &= \lambda_0 + \lambda_\theta \cdot I_{\theta<0.25} + \sum_{i=2}^{4} \lambda_{K,i} \cdot Q_{K,i} + \sum_{i=2}^{4} \lambda_{\frac{n}{N},i} \cdot Q_{\frac{n}{N},i} + \lambda_D \cdot D_H + \varepsilon_R\end{aligned}$$

where $Q_{K,i}$ and $Q_{\frac{n}{N},i}$ are the indicators of the $i-th$ quartile of K and $\frac{n}{N}$.

As discussed in Section 5.1, coefficients $\{\lambda_{K,i}\}_{i=2}^{4}$ are particularly informative of the coefficient c_1, with lower values of $\{\lambda_{K,i}\}_{i=2}^{4}$ implying a more negative c_1. This is because as deal completion rate highly depends on cash deliverable (i.e., when c_1 is more negative), sponsors have stronger incentives to bring in K in order to push through weak deals, tilting the correlation between de-SPAC returns and K towards negative.

To identify how this sensitivity varies across different targets, we extend the above regression by adding the interaction term between target size dummy and the quartile indicators of K:

$$\begin{aligned}R_{sh} =& \lambda_0 + \lambda_\theta \cdot I_{\theta<0.25} + \sum_{i=2}^{4} \lambda_{K,i} \cdot Q_{K,i} + \sum_{i=2}^{4} \lambda_{\frac{n}{N},i} \cdot Q_{\frac{n}{N},i} + \lambda_D \cdot D_H \\ &+ \lambda_L \cdot I_L + \Delta\lambda_K \cdot \sum_{i=2}^{4} I_L \cdot Q_{K,i} + \varepsilon_R\end{aligned}$$

where I_L is the dummy indicating that the target size is above medium, and $I_L \cdot Q_{K,i}$ are the interaction terms.[21] The coefficient λ_L and $\Delta\lambda_K$ are additional moments we target to match as we identify the new parameter c_2. Intuitively, a more negative c_2 implies a greater sensitivity of deal completion rate w.r.t. cash deliverable for larger targets, therefore tilting $\Delta\lambda_K$ towards negative.

The results are reported in Table B.2. Panel A shows that the model fits the data well: the average deal completion rate is about 84%; de-SPAC transactions with large targets tend to deliver better returns; external capital raised through PIPE or FRA tends to signal good returns to non-redeeming shareholders when de-SPAC targets are relatively small, while such external financing raises some red flags in de-SPAC transactions with large targets. Interestingly, these findings seem to suggest that while large targets tend to create more value for SPAC shareholders on average, sponsors also appear to have stronger incentive to bring in PIPE or FPA to push through weak deals of large targets, adding to the nuanced relation between target size and de-SPAC performance.

The parameter estimates, reported in Panel B, are largely consistent with the identification intuition. A negative estimate of c_1 suggests that cash deliverable increases the likelihood of deal completion. A negative estimate of c_2 further shows that this sensitivity is more pronounced in deals with large targets.

Overall, while the extended specification of deal completion rate, explored in this section, sheds additional lights on the effects of target heterogeneity, our baseline results remain robust quantitatively.

[21] Since target size as a standalone entity is unobservable in the data, we proxy it as the value of the merged firm allocated to the target, $n \cdot p$, and we define I_L to be one if $n \cdot p$ is above the sample medium and zero otherwise. We adopt this definition in constructing both the empirical moments and model-implied moments.

Table B.2. Target Size and Deal Completion Probability

This table reports the model fit (Panel A) and parameter estimates (Panel B) when deal completion rate varies across targets. In Panel A, the first column explains the moments most informative of identifying the parameters c_0, c_1, and c_2; the second column reports the regression coefficients that capture these moments; and the last two columns report the empirical moments and the model-implied moments. In Panel B, we report the parameters and their estimated values.

Panel A. Fit of Identifying Moments

Moments	Reg. Coef.	Data	Model
Coef($R_{sh}, Q_{K,2}$)	$\lambda_{K,2}$	0.058	0.101
Coef($R_{sh}, Q_{K,3}$)	$\lambda_{K,3}$	0.056	0.107
Coef($R_{sh}, Q_{K,4}$)	$\lambda_{K,4}$	0.065	0.161
Prob(suc)	q	0.848	0.838
Coef(R_{sh}, I_L)	λ_L	0.449	0.370
Coef($R_{sh}, \sum_{i=2}^{4} I_L \cdot Q_{K,i}$)	$\Delta\lambda_K$	-0.193	-0.145

Panel B. Estimates of Model Parameters

Parameter	Estimated Value
c_0	-0.980
c_1	-0.161
c_2	-0.461

The Incentives of SPAC Sponsors

Online Appendix

A Additional Remarks on the Model

The accounting identities in equations (2), (3) and (4) illustrate the potential sources of dilution to the non-redeeming shareholders' ownership in the combined firm. Clearly, the sponsor's promote shares θ add to the denominator but not to the numerator, and thus dilute firm value. If exercised, warrants are necessarily dilutive, since exercise implies that the warrants are in-the-money, and warrantholders are purchasing shares worth p, for a strike price which is strictly less than p.

While we don't explicitly model the microfoundations of ℓ and ξ, these sponsor-specific characteristics effectively summarize various underlying economic forces. They may implicitly reflect the sponsor's reputational concerns, legal constraints, financial incentives, and other complex interactions influencing behavior towards different investor groups. In our analysis henceforth, we set $\xi = 0$, assuming negligible agency costs between the sponsor and FPA/PIPE investors. This assumption is based on the nature of these investments: FPAs typically represent wealth tied to the sponsor or their associates, eliminating the sponsor's financial incentives to exploit these investors. PIPEs, provided by large institutional investors, carry strong potential for legal recourse if mishandled. By setting $\xi = 0$, we focus on modeling and estimating the more pronounced agency frictions between sponsors and SPAC shareholders, captured by the parameter ℓ.

The optimal weight $\chi = \frac{\sigma_\epsilon^2}{\sigma_\epsilon^2+\sigma_e^2}$ in equation (12) is chosen to minimize the mean squared forecast error, that is:

$$\begin{aligned}\chi &= \arg\min \mathrm{E}\left[R_{sh} - \mathrm{E}_i[R_{sh}|\theta, K, \frac{n}{N}, D_H, \eta_i]\right]^2 \\ &= \arg\min (1-\chi)^2\sigma_\epsilon^2 + \chi^2\sigma_e^2\end{aligned}$$

and the first order condition yields the result.

B Data and Sample Construction

B.1 Variable construction

We provide various cross-sectional data on our sample of SPACs/de-SPACs. These values are presented in Table 2, with raw values presented in Panel A and scaled values presented in Panel B.

IPO Proceeds is fairly self-explanatory, representing the total dollar value of proceeds raised in the SPAC IPO (in millions of \$s), and also represents the value of the SPAC's cash trust if it is fully funded, which essentially they all are. This is the sum of the sought-after proceeds listed in the SPAC's IPO prospectus (Form 424B4), and any additional shares sold via the over-allotment (Green Shoe) option.[22] Sponsor earn-outs are the number of sponsor promote shares tied to earn-out provisions (in millions of shares), while Target earn-out shares are similarly defined for the number of contingent shares given as a portion of the merger consideration paid to the target owners.

In terms of performance metrics, our focus is on the investor's redemption decision, wherein he/she has the choice to exchange their shares for approximately $10 each, or stick with the SPAC shares, in the hope of increasing the payoff. For this reason, we compare the price of the de-SPACed firm 12 months post business combination with the $10 that investors could have had had he redeemed his shares. Call this the return relative to redemption. Then, in addition to the return relative to redemption, we consider that return in excess of an ETF-based benchmark: IPO (Renaissance International IPO ETF). These are straight returns (not annualized), but the post de-SPAC period is 12 months, so essentially annualized returns.

Private Placement is the amount raised via PIPE, FPA, or Backstop agreement, in millions of dollars, while total redemptions are the total number of shares redeemed by SPAC IPO investors (in millions). Promote Shares Forfeited is the number of shares of the sponsor's promote stake that were voluntarily forfeited by the sponsor to push the deal through (in millions), while Private Placement Warrants Forfeited represent the number of private placement warrants that the sponsor offered to forfeit in order to enable the completion of a deal (in millions of warrants). And finally, the total consideration is the total dollar value of consideration paid to the target firm's owners in the business combination (in millions of $).

Panel B shows statistics on a subset of our cross-sectional variables, scaled by IPO shares or promote stake. Private Placement is the size of the PIPE or similar as a percentage of IPO shares sold. Redemption represents the fraction of IPO shares redeemed by IPO investors, Shares Granted and Total Shares are similarly defined for shares given to the target owners in consideration, and total shares outstanding. Finally, Promote Stake Retained gives a reading on the fraction of the promote retained by the sponsor, where IPO shares are redefined in our model as 1, and the baseline promote is then 0.25 shares.

B.2 Method of payment

We need to make one more adjustment to our variable definitions because our model assumes that all SPAC mergers use strictly shares as consideration paid to the target shareholders. However, in reality, some deals in our sample involve some cash consideration. We make the following adjustment to accommodate cash consideration. We divide the cash consideration by the price at the end of the performance period (12 months in our base case), to get a cash-equivalent number of shares. This allows us to convert all cash consideration to shares, yet leave all parties returns unaffected by the adjustment. We also examine the subset of deals that are essentially all cash and get qualitatively similar results.

To provide some context, 38.8% of deals that we study involve cash, meaning that nearly 62% of SPAC business combinations involve only shares. Focusing on the 38.8% of business combinations that involve some cash, just 3 deals are done with 100% cash,

[22] The SPAC promote is typically constructed under the assumption that the Green Shoe option is exercised. In the event the this option is not exercised, the sponsor will forgo the requisite number of shares

and only 33 deals (less than 10% of our sample) are majority financed with cash. Finally, only 27.9% of deals utilize more than 10% cash, and only 22% of deals utilize more than 20% cash.

B.3 Sponsor compensation

We gather information on SPAC sponsor compensation from the Super 8-K that is typically filed a few days after the closing of the proposed business combination. SPACs that are foreign-domiciled (typically in the Caribbeans) file a Form 20-F in lieu of a Super 8-K.

In nearly every SPAC, the sponsor's main source of compensation is the sponsor's *promote shares*. The sponsor's promote is designed so that he/she holds 20% of the sum of IPO shares and promote shares, which means the sponsor's promote is defined as 25% of the IPO shares. The sponsor also purchases securities (usually warrants, but occasionally SPAC units in lieu of warrants). in a private placement coinciding with the SPAC IPO.

Sponsors understand that they can make any proposed deal more palatable to the other parties in the deal (PIPE investors, IPO investors, and target shareholders) if they forfeit, or make contingent, a portion of their compensation. Any such arrangements are typically reported in the Super 8-K and/or an attachment to the Super 8-K, and they are often also reported in the investor presentation that the SPAC/target put together to try to sell the deal to investors.

Sponsors can also potentially improve the economics of a transaction for the other parties by agreeing to tie a portion of their promote shares to performance of the de-SPACed firm in what is known as an earnout. Earnouts are also typically disclosed in the Super 8-K and/or the investor presentation. Figure OA-1 shows a snippet form the Super 8-K describing the business combination between Switchback Energy Acquisition Corp (the SPAC) and Chargepoint Holdings (the target company in the EV charging industry):

From the Super 8-K filed by Switchback Energy Acquisition Corp/Chargepoint Holdings

Filed on March 1, 2021

In addition, pursuant to a letter agreement (the "Founders Stock Letter") entered into by the holders of the Founder Shares (the "initial stockholders") and the Company in connection with the execution of the Business Combination Agreement, immediately prior to the Closing, the initial stockholders (i) **surrendered to the Company, for no consideration and as a capital contribution to the Company, 984,706 Founder Shares held by them (on a pro rata basis), whereupon such shares were immediately cancelled**, and (ii) **subjected 900,000 Founder Shares (including Common Stock issued in exchange therefor in the Merger) held by them to potential forfeiture in accordance with the terms of the Founders Stock Letter.** Upon the Closing, all outstanding Founder Shares converted into Common Stock on a one-for-one basis and the Founder Shares ceased to exist.

Forfeited shares highlighted in **yellow**, earnout shares in **green**

Figure OA-1. Super 8-K

This figure illustrates an example of source where we identify the sponsor's compensation using Super 8-K. Forfeited promote shares are highlighted in yellow and earnout shares are highlighted in green.

This information is also sometimes available in an attachment to the Super 8-K, especially the Unaudited Condensed Pro-Forma Information, as shown in Figure OA-2.

From the Unaudited Condensed Pro-Forma Information attached to the Super 8-K

The following summarizes the New ChargePoint Common Stock issued and outstanding immediately after the Business Combination:

	Pro Forma Combined (Shares)	%
Switchback Class A stockholders	31,378,754	11.3
Switchback Class B stockholders[1]	6,868,235	2.5
Former ChargePoint stockholders[2][3]	217,021,368	78.1
PIPE Financing	22,500,000	8.1
Total	**277,768,357**	100.0

(1) Amount excludes the **984,706 Founder Shares surrendered to Switchback** and **includes 900,000 shares of New ChargePoint Common Stock subject to forfeiture until the Founder Earn Back Triggering Event has occurred.**

Forfeited shares highlighted in **yellow**, earnout shares in **green**

Figure OA-2. Super 8-K

This figure illustrates an example of source where we identify the sponsor's compensation using the unaudited condensed Pro-Forma information attached to the Super 8-K. Forfeited promote shares are highlighted in yellow and earnout shares are highlighted in green.

Earnouts In our sample, 88 of our SPACs tie significant portions of the Sponsor promote to performance targets, utilizing what are known as "earnouts" (or sometimes written earn-outs, hereafter, EOs). This is approximately one quarter of the sample of SPACs. Among these 88 SPACs, the average sponsor ties about 40% of their promote stake to an EO.

By agreeing to tie a portion of their compensation to performance targets (usually, but not necessarily, a price target), clearly the sponsor is giving up something, the question is how much? In this appendix, we describe our implementation of the binomial model of Cox et al. (1979), including any simplifying assumptions made specifically for the purpose of valuing EOs.

Structure of a Typical EO

In an EO, the sponsor offers to tie a portion of their promote stake to the performance of the target company post de-SPAC. In a typical de-SPAC transaction, the sponsor's promote stake (set to be 25% of the SPAC's original IPO shares) vests upon the consummation of a business combination. But with an EO clause, a portion of the promote is tied to an EO and does not vest unless the provisions of the EO are met. Though performance targets are sometimes set based on accounting goals (i.e., revenues, EBITDA, etc.) or non-financial performance (e.g., approval of a drug), by far the most common structure uses share price as the relevant performance benchmark. Recall that in a SPAC, shares have a par or book value of $10 each. EO price targets are typically set noticeably or considerably above $10, implying that the sponsor only retains ownership of any EO shares if post de-SPAC performance is decent or exceptional, depending on the price target and time dimension. In our sample, price targets are as low as \$11 per share and as high as \$50 per share.[23] In terms of timing, we see EOs as short as 6 months out to as long as 10 years. Moreover, EOs can be complex, with multiple price targets and expiry dates. Most EOs have price targets of \$12.50 to \$15.00, and maturities of two to five years. In order to avoid incentives to manipulate the share price, most EO clauses insist that the post de-SPAC share price must surpass the EO target share price on 20 or more days in any given 30-day period prior to the expiry date of the EO, meaning that a performance target need not only to be met, but *maintained* to qualify for vesting.

The following example of an EO has a structure that is typical of those we see in our sample. A SPAC sponsor creates a SPAC to raise \$200M. As such, his promote stake is 5,000,000 shares with a par value of \$50M. Suppose that in order to make the SPAC more palatable to all parties, the sponsor agrees to tie half the promote stake to an EO. The EO has 2 triggers, one at \$12.50/shr and the other at \$15.00/shr. The \$12.50 trigger has to be reached within 1 year, while the \$15 trigger has to be reached within 2 years. Suppose that half the EO is associated with each price target and each expiry date. Thus, 1,250,000 shares are released to the sponsor if the share price exceeds \$12.50 in the first year following the de-SPAC, and another 1,250,000 shares will be released to the sponsor if the share price exceeds \$15.00 in the first two years following the de-SPAC. A reminder that in our example, the sponsor retains 2,500,000 worth of promote shares that vest immediately upon the consummation of a business combination. Remember too that though option-like, the EOs are different from options, in that if the trigger price is breached for the requisite number of days the shares vest immediately w/o payment, whereas call options would require payment of an exercise price.

Our Approach

To evaluate our EOs, we follow Cox, Ross, and Rubinstein (1979), hereafter CRR, and construct binomial trees to evaluate the EOs in our sample of SPACs. We evaluate each EO contract based on its terms (trigger price(s) and EO duration(s)) and based on a set of universal assumptions. Specifically, we assume an underlying volatility of the ongoing (de-SPACed) firm of $\sigma = 60\%$ per year and a risk-free rate of 2%. We construct binomial trees with semi-annual periods if the maturity of EO, T_{EO}, is within 5 years, and annual time-step if $T_{EO} > 5$ years.

Following CRR, and with the above assumptions, we define u and d, the returns in the "up" and "down" states, respectively, as: $u = e^{\sigma\sqrt{t}}$ and $d = e^{-\sigma\sqrt{t}}$, with $\sigma = 60\%$ and t equal to either 0.5 years or 1 year, depending on T_{EO}.[24] In this setting, CRR showed that the risk-neutral probability in such a case is given by: $q = \frac{e^{rt}-d}{u-d}$. We treat reaching a given price as equivalent to staying there for 30+ consecutive days, and therefore satisfying the "price maintenance" portion of the EO's payment clause. We use the usual iterative procedure to evaluate the EO, beginning at the EO expiration and working backwards. Additionally we note that vesting (early exercise of the EO "option") will always occur

[23] Note: one firm has several EO triggers (actually 8 in total, running from a low of \$15 to a high of \$200/share) that exceed \$50, but this is the only firm with a trigger over \$50, so not representative. We feel that stating the max as \$50 is more informative, though technically not 100% accurate.

[24] Note that in our comprehensive dataset of SPACs, the average volatility of post de-SPAC 3-month returns is about 57% , which is considerably higher than a 60% annualized volatility. However, our performance data cover the initial 3-month window immediately following the de-SPAC, which is a particularly volatile period for the newly de-SPACed shares.

immediately upon breaching a price trigger.[25]

In this framework, the value at any node, t, where the share price is denoted, P_t, the EO value by $V_{EO,t}$, and the value of the EO in the following period denoted as $V_{EO,u}$ with risk neutral probability q, and $V_{EO,d}$ with risk neutral probability $(1-q)$, the value of the EO at node t will be given by:

$$V_{EO,t} = \begin{cases} P_{t,} & \text{if } P_t \geq P_{EO} \\ \left[qV_{EO,u} + (1-q)\,V_{EO,d}\right] e^{-rt}, & \text{if } P_t < P_{EO} \end{cases} \tag{21}$$

By definition, $V_{EO,0} < P_0$ because the manager would always prefer a "free" share to an EO share. We value each EO according to it's fundamentals (trigger price and expiry date) and our simplifying assumptions, with the goal of determining the equivalent amount of promote stake that the sponsor has voluntarily given up by tying a portion of their promote stake to an EO. As a means of benchmarking, and to give an example, a 5-year EO with a trigger price of \$15.00, a fairly typical structure, has a value of \$8.98/share when the share price is \$10. This represents a 10.2% reduction in value. Suppose further that the sponsor has tied half of her promote stake to such an EO, we would characterize this sponsor as having given up 5.1% of her promote stake.

As mentioned earlier, among the 88 SPACs who's sponsors agree to tie a portion of their promote to an EO, the average sponsor agrees to tie 40% of their promote to an EO, with the range running from a low of 4.5% to a high of 100% (there are 6 SPACs whose sponsors agree to tie their entire promote to an EO). Based on our volatility assumptions, we estimate that this willingness of the sponsors to tie an average of 40% of their promote to EOs, results in a value loss of about 6.8% of their promote stake, relative to simply retaining the shares.

C The Target Search Process

Here we provide a detailed narrative of the search process two of our sample SPACs that eventually successfully de-SPACed. The goal here is to give the reader a sense of the extensive due diligence that goes into an eventual successful de-SPAC.

C.1 Examples of Detail of SPAC's Target Search Process: Harmony Acquisition/NextDecade

Note: The below discussion is taken directly from the text of Harmony's DEFM 14A (proxy statement) filed on June 29, 2017 (pp. 56-61).

Promptly following Harmony's initial public offering, Harmony's officers and directors contacted several investment bankers, private equity firms, consulting firms, legal and accounting firms, as well as numerous other business relationships. Harmony also signed fifteen nonexclusive contingent-based finder fee agreements with independent third parties ("Finders"). These agreements stipulate that the Finder is operating as an independent contractor and does not have any authority to act for, represent or bind Harmony. Such agreements generally also contained confidentiality agreements and provisions limiting the Finders' right to make any claim against Harmony's trust account. Finally, the

[25] Unlike in the case of a call option, the EO does not sustain any "insurance value", in the sense that owning the shares always strictly dominates retaining the EO.

agreements provide for the payment of a fee equal to a percentage of the enterprise value of a company with which Harmony ultimately completes a business combination. In addition, Harmony signed a non-exclusive finder fee agreement with one investment banking firm that required an upfront fee of $15,000 in addition to a contingent fee based upon the completion of a merger with a target identified by said firm. Harmony also entered into an agreement with Canaccord Genuity Inc. ("Canaccord") pursuant to which Canaccord provided Harmony with certain financial advisory services in connection with a preliminary review of potential merger and acquisition opportunities for a period of 18 months from the consummation of the initial public offering. In consideration of such services, Harmony paid Canaccord a fee of $135,000 in cash upon consummation of the offering. While these independent contractors presented Harmony with a number of potential acquisition candidates, Harmony did not sign a merger agreement with any of the targets presented by the Finders. As such, there is no fee payable upon the consummation of the business combination.

Through the Finders, Harmony's Board's and management's personal relationships, Harmony identified and reviewed information with respect to over 110 private companies, from which it entered into substantial discussions with 25 companies. These included discussions regarding the type and amount of consideration to be provided relative to a potential transaction. Harmony ultimately issued 14 letters of intent. Of these, only three letters of intent were fully executed by Harmony and its potential merger partners.

Specific Negotiations:
LED: Harmony signed its first letter of intent with a global designer and marketer of LED lighting solutions ("LED"). On April 30, 2015, Harmony was introduced to LED by one of its Finders. Over the next three months, Harmony reviewed financial and operational diligence material provided by LED and held detailed discussions with LED's management team. Harmony and LED also had detailed discussions regarding the framework of a transaction, including total deal consideration. On July 31, 2015, Harmony and LED executed a non-binding letter of intent, which provided for a 60 day due diligence period. During the diligence period, it became clear that LED would be unlikely to meet its revenue projections for 2015 and discussions were put on hold indefinitely. Over the following 12 months, Harmony continued to engage in a dialogue with LED, but determined that pursuing other alternatives would likely create greater shareholder value.

Mundo: Harmony signed its second letter of intent with MUNDOmedia ("Mundo"), a global leader in performance-based, data-driven customer acquisition and monetization. On August 29, 2016, David D. Sgro, Harmony's Chief Operating Officer, received an email submission on Harmony's website from a shareholder of Mundo. Following numerous discussions and the exchange of information, Harmony and Mundo entered into a letter of intent on November 4, 2016. Following confirmatory due diligence, Harmony and Mundo entered into an Agreement and Plan of Reorganization (the "Amalgamation Agreement") on January 7, 2016. On February 23, 2017, Harmony received notice that Mundo had terminated the previously executed Amalgamation Agreement and Harmony issued a press release later that day indicating that it believed the termination to be ineffective. On March 13, 2017, Harmony announced that it had reached an amicable resolution of its dispute with Mundo and that the Amalgamation Agreement was terminated effective February 23, 2017.

NextDecade: Prior to engaging in discussions with Harmony on February 23, 2017, principals of the Investment Banking & Advisory ("IBA") division of Height Securities, LLC ("Height"), financial advisor to NextDecade, had been conducting extensive research and due diligence of the special purpose acquisition company ("SPAC") market to identify and pursue (on behalf of their client) prospective acquirers of NextDecade. Height had approached several candidates through the course of this process, and had also explored the prospect of (a) an initial public offering of NextDecade; and (b) a reverse merger with a publicly traded small-cap company. Multiple potential candidates executed non-disclosure agreements with NextDecade, and gained access to NextDecade's virtual data room. By virtue of their focus on the SPAC market in the preceding months, Height IBA professionals had taken immediate note of Harmony's announcement of having received a termination notice from Mundo; a press release was issued slightly after 3:00 p.m. ET on February 23, 2017. Height assumed that, given Harmony's apparent need to identify a new business combination target, as well as its impending deadline to complete an initial business combination (March 27, 2017), Harmony might be willing to and interested in speaking with Height regarding NextDecade.

C.2 Examples of Detail of SPAC's Target Search Process: Gores/TWNK (Hostess)

Note: The below discussion is taken directly from the text of Gores' DEFM 14A (proxy statement) filed on October 21, 2016 (pp. 158-166).

Prior to the consummation of our IPO, neither the Company, nor anyone on its behalf, contacted any prospective target business or had any substantive discussions, formal or otherwise, with respect to a transaction with the Company.

After our IPO, the Company commenced an active search for prospective businesses and assets to acquire. Representatives of the Company, our Sponsor and The Gores Group contacted and were contacted by a number of individuals and entities with respect to acquisition opportunities.

During that period, our management, our Sponsor and The Gores Group:

• considered and conducted an analysis of over forty potential acquisition targets (other than Hostess) (the "Other Potential Targets");

and

• ultimately engaged in detailed discussions, due diligence and negotiations with eight target businesses or their representatives, entering into non-disclosure agreements with seven of those eight potential acquisition targets.

The eight potential targets included (i) an industrial services company in transportation, construction, agriculture and other industries ("Company A"),(ii) an industrial services company servicing industries including oil and gas ("Company B"), (iii) a company in the technology industry ("Company C"), (iv) an industrial services company in the waste management industry ("Company D"), (v) a company in the global leisure industry ("Company E"), (vi) the packaging division of a company in the industrial services industry ("Company F"), (vii) an industrial services company in the waste management industry("Company G"), and (viii) a company in the branded food industry ("Company H").

Specific Negotiations:

The Company's discussions with Company A stalled in early 2016 due to a decline in the business performance of Company A, and ultimately in May 2016, Company A decided to postpone its sale process and remain a private company.

The Company was engaged in discussions with Company B from September 2015 through April 2016, until Company B advised the Company that it was postponing its sale process due to its inability to obtain the desired valuation from potential acquirers.

The Company and Company C were in discussions during early 2016. However, in March 2016, Company C advised the Company that it had decided to remain a private company.

Discussions between the Company and Company D began in October 2015. However, in the spring of 2016, Company D advised the Company that it was unable to obtain the desired valuation from potential acquirers and was terminating its sale process.

The Company was engaged in discussions with Company E in November 2015. After Company E advised the Company that it was unable to obtain the desired valuation from potential acquirers, Company E completed an initial public offering in the European public markets.

Company F and the Company engaged in discussions regarding the spin-off of Company F's packaging business in October 2015, but discussions ended in November 2015 due to the parties' differing viewpoints as to Company F's valuation.

Company G and the Company engaged in discussions in April 2016 and May 2016, but in May2016 Company G entered into a transaction with another acquirer.

The Company was also in discussions with Company H throughout April 2016 and May 2016, but due to a decline in Company H's performance and the progression of the discussions with Hostess, the Board ultimately unanimously determined that the Business Combination with Hostess was the most attractive potential transaction and thereafter primarily focused its efforts on Hostess.

Throughout September 2015, Mr. Andy Africk of Searay Capital and a former partner of Apollo Management, L.P., and Mr. John Janitz of Evergreen Capital Partners met several times to discuss possible business combination opportunities for the Company, including a possible business combination with Hostess. Independent of the conversations between Messrs. Africk and Janitz, on October 1, 2015, representatives of the Company, including Mr. Mark Stone, Chief Executive Officer of the Company, Mr. Kyle Wheeler, President of the Company, and Mr. David Leeney of The Gores Group, attended a meeting with a third party in New York City, during which the Company was informed of several acquisition opportunities, including a potential transaction involving Hostess.

D Additional Figures and Tables

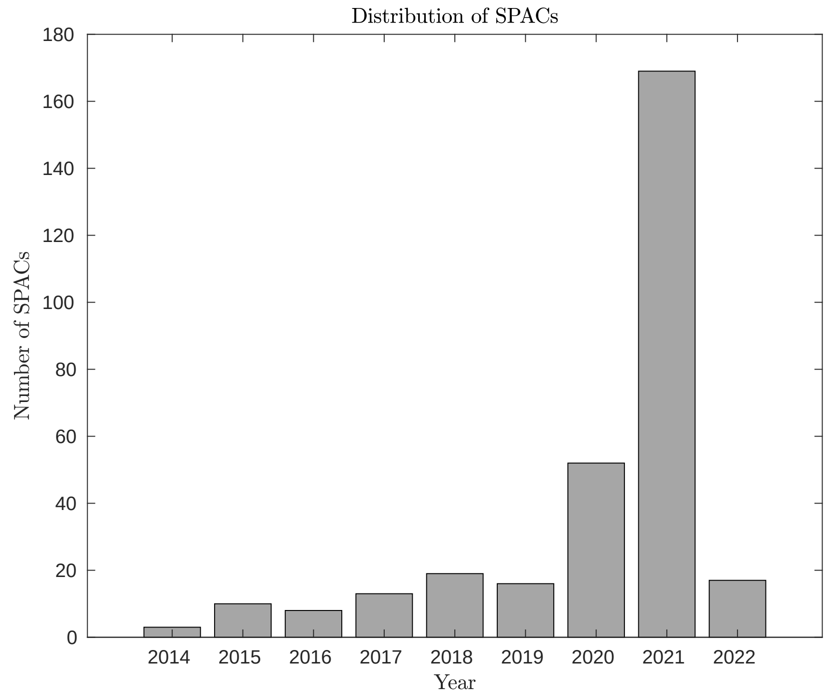


Figure OA-1. Distribution of SPACs in the sample

This figure plots the number of SPACs that have completed their business combination by the end of the first quarter of 2022 (i.e., by March 31st, 2022). The x-axis represents the year when the SPACs completed their mergers, and the y-axis represents the number of SPACs that completed the mergers in each year.

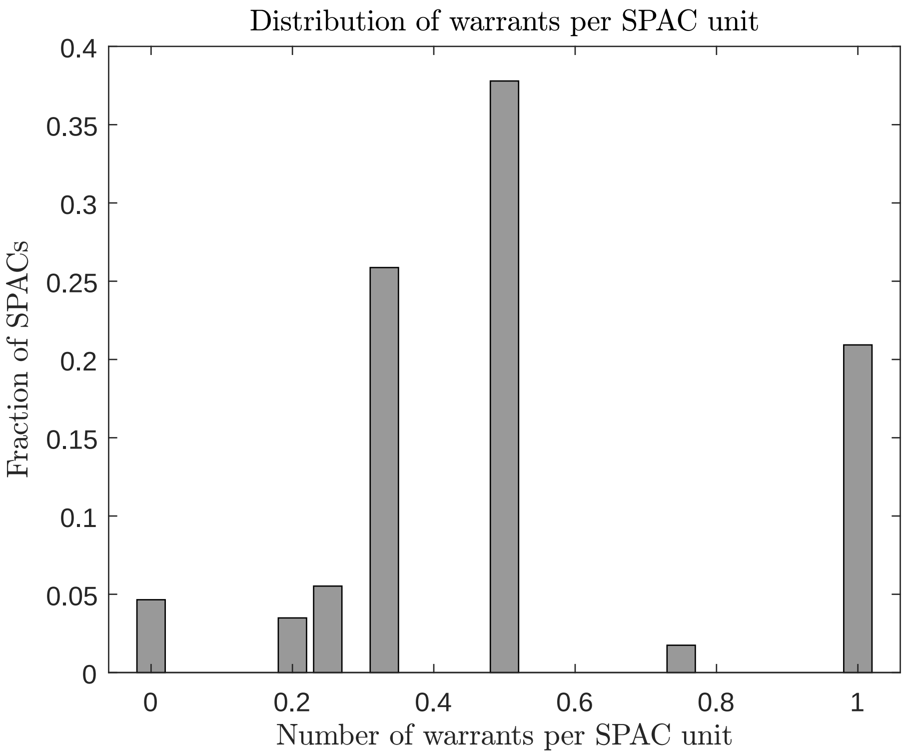


Figure OA-2. Distribution of warrants per SPAC unit.

This figure shows the distribution of SPACs that issue different numbers of warrants in their IPO units. Each IPO unit is composed of one share and w warrant and the common choice of w is 0, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1. x-axis represents w and y-axis represents the fraction of SPACs that issue w warrants in each of their IPO unit.

Table OA-1. Number of SPACs over Time

This table reports registered number of SPACs and the deal outcomes in our sample. A SPAC is considered "registered" if they have filed From S-1 with the SEC. "Completed Combo" refers to SPACs that have successfully completed a business combination. "Liquidated" refers to SPACs that were unable to complete a business combination within the designated time frame and decided to redeem all shares and liquidate. "Deal on Table" refers to SPACs that have announced but not yet completed a business combination. Finally "Still Seeking" refers to SPACs that have yet to identify a partner with whom to pursue a business combination. This is based on the status as of March 31, 2022.

	Total Registered	Completed Combo	Liquidated	Deal on Table	Still Seeking
2009	1	1	0	0	0
2010	8	3	5	0	0
2011	12	8	4	0	0
2012	1	0	1	0	0
2013	10	8	2	0	0
2014	15	11	4	0	0
2015	16	14	2	0	0
2016	15	13	2	0	0
2017	34	31	3	0	0
2018	45	42	2	0	0
2019	57	40	3	1	2
2020	314	161	0	33	120
Totals	548	344	28	34	122