Venture Capital and Adaptive Innovation: Evidence from Clinical Trial Diversity*

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Abstract

While the association between venture capital (VC) involvement and portfolio company outcomes is well studied, less is known about how VCs influence innovation behavior, particularly in response to shifting regulatory and societal expectations. We study how biopharmaceutical firms adjust their clinical trial practices amid heightened post-COVID demands for participant diversity. Using patient composition data from clinical trials before and after the pandemic, we find that VC-backed firms enhance trial diversity more than similar non-VC-backed firms. Further evidence suggests that this response is driven by VCs' prior experience in drug development. Our findings highlight the role of VC in shaping not just innovation outcomes, but also how firms strategically respond to external pressures.

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1 Introduction

Venture-backed firms are widely considered engines of modern innovation, credited with driving waves of technological advancement such as the biotechnology revolution of the 1980s. While venture capital (VC) funding constitutes a relatively small portion of overall capital markets, its role in fueling innovation and economic growth is disproportionately large (Kortum and Lerner, 2000; Lerner and Nanda, 2020). Despite this recognized impact, the mechanisms through which VCs shape the internal innovation processes of their portfolio companies remain insufficiently understood. This study addresses this gap by examining how VCs influence firms' adaptation of innovation activities in response to an evolving environment.

Existing research has established a robust link between VC backing and portfolio company innovation intensity and output, as well as broader measures of success such as IPOs, acquisitions, and productivity (Sørensen, 2007; Chemmanur, Krishnan and Nandy, 2011; Bernstein, Giroud and Townsend, 2016). While the literature focuses mostly on aggregate firm-level outcomes, this paper shifts attention to project-level dynamics by leveraging detailed clinical trial data from biopharmaceutical companies and exploiting an exogenous shift in regulatory and societal expectations for trial diversity.

The biopharmaceutical industry provides a unique lens into process-level innovation activities that are typically difficult to observe in other sectors. Therapeutic product development—particularly during the clinical trial stage—is highly structured and regulated, and requires public disclosure of detailed trial information, enabling granular analysis of firm behavior. In the United States, a series of federal statutes and regulations establish mandatory registration and, in many cases, results reporting for interventional studies of Food and Drug Administration (FDA)-regulated drugs, biologics, and devices.[1] Importantly for our purposes, the 2017 Final Rule mandates submission of results information to ClinicalTrials.gov that includes participant racial composition, when collected, enabling systematic measurement of racial diversity in trial enrollment.

The exogenous environmental shift utilized in this study is the COVID-19 pandemic, which sharply increased societal expectations and regulatory requirements for clinical trial diversity. Heightened public scrutiny followed widespread media coverage highlighting the disproportionate

[1] The FDA Modernization Act of 1997 (FDAMA), the FDA Amendments Act of 2007 (FDAAA), and the 2017 Final Rule (42 CFR Part 11).

burden suffered by racial and ethnic minority communities in terms of infection rates and fatality.[2] In response, leading vaccine developers such as Moderna and Novartis publicly committed to increasing clinical trial diversity, followed by broader industry and institutional initiatives extending beyond COVID-related trials. This surge in public and industry attention translated into regulatory actions, notably the 2020 FDA guidance recommending strategies to enhance trial diversity and culminating in the 2022 Food and Drug Omnibus Reform Act (FDORA), which mandates Diversity Action Plans with enrollment targets for pivotal trials. Appendix B provides a timeline of these key developments, while Figure 1 presents Google Trends data for the phrase "diversity in clinical trials," showing a sharp increase in attention beginning in early 2020. Taken together, these indicators signal a sharp environmental change that forms the basis for our empirical design, allowing us to examine how VC-backed and non-VC-backed firms differentially adapt their clinical trial practices in the post-COVID period.

We utilize the biopharmaceutical industry setting and the COVID-19-induced environmental shift to examine whether and how VC-backed companies adjusted clinical trial diversity differently than their non-VC-backed counterparts. The effect of VC involvement is ex ante ambiguous. On the one hand, increasing trial diversity requires recruiting underrepresented populations, which may prolong drug development timelines.[3] Given VCs' finite investment horizons, VC-backed firms may exhibit weaker improvements in trial diversity. On the other hand, improving trial diversity requires financial resources and managerial expertise to adjust trial designs and recruitment strategies. VCs may provide capital, strategic guidance, and industry expertise that enable their portfolio companies to respond more effectively to heightened regulatory and social expectations, resulting in larger increases in trial diversity.

Using a sample of around three thousand clinical trials, we find that VC-backed firms increased trial racial diversity more than a matched group of non-VC-backed firms in response to COVID-19. Our primary measure of trial racial diversity, Simpson's Diversity Index, increased by 37.5% of the sample mean for VC-backed companies relative to the control group.[4] Further analyses indicate

[2]Representative media coverage includes Hernández and Klemko (2020), LeBlanc (2020), Cosgrove and Vives (2020), and Abrams (2020).

[3]Recruiting ethnic minority participants is generally more time-intensive, often extending the duration of the recruitment process (e.g., Kiernan et al. 2000; Haley et al. 2017; Sam, Hill and Hamer 2023).

[4]Simpson's Diversity Index measures the probability that two randomly selected participants belong to different racial groups. A growing literature on racial diversity in clinical trials uses this index to quantify the racial diversity of trial participants (e.g., Rees et al. 2022; Abdel-Rahman et al. 2021; Racadio et al. 2024; Choi et al. 2025).

that this effect is driven primarily by VCs' prior drug development experience, rather than by new financing or the social affinity of VC partners to minority groups. In particular, consistent with lead VCs' primary responsibility for monitoring and advising portfolio companies relative to non-lead VCs, the effect is associated with the drug-development experience of lead VCs. We further find evidence that VC involvement influences trial site selection by shifting trials toward areas with a high share of racial minority residents, suggesting a plausible operational channel underlying this effect.

Our empirical approach employs a difference-in-difference (DiD) design that compares pre- versus post-COVID changes in trial diversity for VC-backed firms with those for non-VC-backed firms. To isolate the effect of VC backing from pre-existing observable differences, we identify a treatment group of VC-backed firms and match them to a control group of non-VC-backed firms using propensity score matching based on pre-pandemic characteristics, including firm age, public status, and prior trial activity. Our core estimation uses trial-level regressions with firm fixed effects, along with trial start year, phase, and disease-group fixed effects, which absorb time-invariant firm heterogeneity and account for systematic variation over time and across therapeutic areas. We further investigate the mechanisms underlying the main effect by exploiting heterogeneity in VC firm and partner characteristics, post-shock financing, and trial site selection.

Overall, our results provide novel evidence on VCs' dynamic influence on firms' innovation process, extending prior work that relies on static comparisons or firm-level outcomes such as research and development (R&D) intensity and patenting.[5]

Our paper relates to the literature on diversity and inclusion in corporate decision-making, which has largely focused on the determinants and consequences of gender diversity on corporate boards (Adams and Ferreira, 2009; Kim and Starks, 2016; Greene, Intintoli and Kahle, 2020; Gormley et al., 2023). By contrast, far less attention has been paid to how firms' product development choices affect inclusion, particularly with respect to whether technologies are designed to serve racial and gender minorities.

[5]The literature primarily examines firm-level or static innovation outcomes, including firm failure and exit via IPO or acquisition, operating performance, R&D investment, and patent quantity and quality (Chemmanur, Krishnan and Nandy, 2011; Puri and Zarutskie, 2012; Kortum and Lerner, 2000; Sørensen, 2007; Bernstein, Giroud and Townsend, 2016; Lerner and Nanda, 2020). Related work studies whether VCs actively shape portfolio company behavior through monitoring, professionalization, managerial intervention, and strategic guidance (Hellman and Puri, 2002; Ewens and Marx, 2018), as well as VCs' influence on the direction of innovation and R&D strategies (Da Rin and Penas, 2017; Li, Liu and Taylor, 2023).

More broadly, our findings speak to growing concerns about equity in technology development across other industries, such as cosmetics, consumer electronics, and artificial intelligence.[6] Whereas this literature largely takes technology as given and documents resulting biases, our analysis speaks to the determinants of whether firms develop inclusive versus biased technologies and highlights the potential role of VCs in facilitating strategic adaptation to evolving equity expectations, particularly for early-stage firms that may otherwise lack the experience or expertise to adapt effectively.

By focusing on clinical trial diversity within the drug development process, our findings have important public health implications, as drug exposure and responses vary across racial and ethnic groups for approximately 20% of approved drugs (Ramammorthy et al., 2015). Our study joins a small but growing literature on racial diversity in clinical trials, which examines minority representation in specific contexts (Murthy, Krumholz and Gross, 2004), willingness to participate (Wendler et al., 2006), and the scientific value of diversity in medical research (Oh et al., 2015). Despite this growing interest, systematic evidence on cross-sectional and time-series variation in trial racial diversity remains limited. We contribute to this literature by providing the first large-sample evidence on the importance of VC ownership for trial racial diversity.

The remainder of the paper proceeds as follows. Section 2 develops the hypotheses. Section 3 describes the data and empirical strategy. Section 4 presents the main results on the effect of VC backing on firms' adaptive response in trial diversity. Sections 5 explores potential mechanisms underlying this effect. Section 6 provides evidence of how VC guidance manifests in firms' operational behavior regarding trial site selection. Section 7 concludes.

2 Hypothesis Development

We develop hypotheses on whether and how VC influences biopharmaceutical firms' responses to a major external shock that elevated expectations for racial diversity in clinical trials.

A Primary Hypothesis

One view suggests that VC involvement may dampen improvements in trial diversity, given the pressure VCs face to achieve timely exits. Typically, VC funds have between five to eight years to

[6] Buolamwini and Gebru (2018); Obermeyer et al. (2019); Greenwald et al. (2024); Wilson and Caliskan (2024); Fitch (2019); Deighton (2021); Mosbergen (2023).

invest in startups and sell their ownership stakes, which can impose binding constraints on their investment decisions (Barrot, 2017). For example, Shin, Bae and Ozmel (2025) document that VC-backed firms prioritize strategies that accelerate milestone completion and commercialization at the expense of product quality. Recruiting racial minority populations is time-intensive and can prolong trial timelines due to structural and logistical challenges (Kiernan et al., 2000; Haley et al., 2017; Sam, Hill and Hamer, 2023; Pardhan et al., 2025), potentially clashing with VCs' time-sensitive exit targets.[7]

An opposing view posits that VC-backed firms may exhibit larger increases in trial diversity because they can adapt more effectively to shifting social and regulatory demands. Increasing trial diversity is resource-intensive, requiring funding, operational know-how, and cultural competence. VCs, especially those with healthcare experience, may be well-positioned to support these complex adaptations.

Hypothesis 1. VC-backed biopharmaceutical firms experience larger increases in trial racial diversity after the COVID-19 pandemic.

B Mechanisms

Next, we propose three mechanisms by which VC involvement could drive post-shock increases in trial diversity. The first mechanism relates to the financial capacity of VC-backed firms. Conducting a clinical trial is costly, particularly in patient recruitment.[8] Increasing trial diversity can further raise these costs, as it often requires hiring culturally competent outreach specialists and patient navigators, developing tailored educational materials, and providing transportation or childcare support to participants (Jaklevic, 2020). Marquez et al. (2003) finds that recruitment costs were roughly five times higher when targeting minority participants, while Endocrine Society (2007) estimates that enrolling minority participants can add 10–15% to total trial costs.

A large body of research shows that VC financing alleviates firms' funding constraints and supports growth (e.g., Kortum and Lerner 2000; Iliev and Lowry 2020). Within this framework,

[7]Highlighting this tension, when discussing how to improve racial diversity of clinicial trials, a senior executive at a pharmaceutical company noted: "From a company standpoint, we also have to be OK with the fact that it may take longer to recruit those clinical trials, but for a company to be OK with that, the investors also have to be OK with that... because a lot of them want to see results as fast as they can." Hodge (2020).

[8]Moore et al. (2020) estimate approximately an average of $19 million per trial or $41,413 per patient. Recruitment expenses account for the largest share—about 32% of total costs (Deloitte, 2020).

VC funding can help startups manage the incremental expenses associated with conducting more diverse clinical trials.

Hypothesis 2A. The effect of VC backing on improvements in trial diversity is concentrated among firms that obtained VC capital injection after the pandemic onset.

The second mechanism involves the specialized managerial guidance VCs may provide to help firms navigate the operational complexities of conducting diverse clinical trials. Improving trial diversity is often hindered by a "knowledge gap": many drug companies lack the specialized expertise required to effectively recruit underrepresented populations (Jaklevic, 2020). This expertise is critical because the primary facilitators of trial diversity are fundamentally operational tasks that require specialized managerial intervention.[9] As illustrated by the contrasting outcomes of two recent trial diversity initiatives described in Appendix B, the success of diversity initiatives depends less on the provision of capital and more on the quality of active managerial execution.

Many of the VCs in our sample specialize in healthcare and have decades of experience helping pharmaceutical companies conduct clinical trials and secure FDA approvals. VC-backed firms may therefore hold an advantage in executing initiatives that enhance trial diversity. Crucially, this advantage is not a product of general VC reputation or passive capital, but rather the transmission of domain-specific expertise through active advising. We therefore posit that the positive impact on improving trial diversity is conditional on both the relevance of the VC's experience and their active role in firm operation.

Hypothesis 2B. The effect of VC backing on improvements in trial racial diversity is concentrated among the firms backed by VCs who possess specific industry experience and maintain an active advisory role.

A third potential mechanism draws on homophily theory, which suggests that individuals are more likely to empathize and collaborate with those who share their demographic background or lived experiences (McPherson, Smith-Lovin and Cook, 2001). Following the death of George Floyd in 2020, public discourse frequently attributes corporate diversity gains to the advocacy of minority business leaders who, driven by "value homophily", pushed for institutional equity (see Appendix B for detailed examples).

[9]Pardhan et al. (2025) identifies mistrust, logistical hurdles, and perceived bias as core barriers, noting that participation is driven by operational facilitators: personalized outreach, linguistically appropriate materials, and community-based educational workshops.

In the context of our study, the COVID-19 pandemic and the 2020 surge in Black Lives Matter (BLM) movement created a unique convergence: rising expectations for trial diversity coincided with a national call for racial justice. It is therefore possible that the positive VC effect on trial diversity improvement is driven by minority VC partners who acted as internal catalysts to prioritize inclusive recruitment within portfolio firms.

However, this mechanism may serve as a competing hypothesis rather than a primary driver. Despite the momentum of the BLM movement, the VC industry remains remarkably homogeneous, with racial and ethnic minorities holding only a small fraction of partner-level positions.[10] Given this structural scarcity, it is unclear whether minority partners are numerous enough to account for the improvements in trial diversity in VC-backed firms. We therefore present the following as an exploratory hypothesis.

Hypothesis 2C. The effect of VC backing on improvements in trial racial diversity is concentrated among firms where minority VC partners serve on the board.

C Operational Channel

Finally, we explore a concrete operational channel through which VCs may exert influence on companies to improve trial diversity: the geographic selection of clinical trial sites. A growing literature documents that the demographic composition of the population surrounding a trial site is a determinant of the racial diversity of enrolled participants (Lee et al. 2024; Jiang et al. 2025). For example, using a sample of 124 trials, Ivory et al. (2025) show that sites located in neighborhoods with the highest proportion of Black residents enrolled Black patients at a rate of 16.2%, compared to just 1.4% at sites in neighborhoods with the lowest Black population.[11]

However, relocating or expanding trials to new geographic areas is inherently difficult and costly (Lai et al., 2021). Firms often face significant "information frictions" regarding a new site's infrastructure, staff quality, and operational reliability. In addition, recruitment practices that work

[10] Gompers and Wang (2017) document that African Americans represented less than 1% of the VC labor pool. An industry report highlights that diverse-owned firms manage only 1.4% of total U.S.-based assets under management (Knight Foundation and Bella Private Markets, 2021) .

[11] Further underscoring the importance of trial location, Bruner et al. (2015) report that, on average, patients of color traveled shorter distances to participate in clinical trials (median 5.9 miles for Black patients versus 12.9 miles for White patients). Industry stakeholders also acknowledge the role of site location in promoting diversity. Pharmaceutical Research and Manufacturers of America (2021) identify "Five Key Strategies" to improve trial diversity, with the first being the development of a network of clinical trial sites in underserved communities.

well in one location may not translate effectively to another, creating substantial uncertainty.

VC expertise and network may help firms navigate unfamiliar local conditions and build new community partnerships. Many VC investors specialize in supporting pharmaceutical companies through complex trial design and execution decisions. Their experience in evaluating, selecting, and managing clinical sites may provide valuable guidance to firms seeking to expand into new geographic areas to recruit more racially diverse participants.

Hypothesis 3. VC-backed firms experience larger increases in the fraction of trial locations in areas with high minority population following the COVID-19 pandemic.

3 Data and Empirical Strategy

A Data Sources

Our analysis draws on two primary data sources that together allow us to link venture capital ownership to clinical trial characteristics. We obtain detailed clinical trial information from ClinicalTrials.gov (CTG) and data on venture capital investments from VentureXpert. We supplement these sources with additional datasets that provide investor attributes and drug-development milestones.

CTG is a comprehensive public registry to which sponsors and investigators submit clinical study information either in response to legal and policy requirements or voluntarily. We retrieve CTG trial-level data such as trial sponsors, study phase, intervention type, disease focus, key dates, and demographic composition of enrolled participants from the Aggregate Analysis of ClinicalTrials.gov (AACT) database accessed through the Clinical Trials Transformation Initiative (CTTI) portal. AACT provides a relational database version of all publicly available records in CTG, updated daily and standardized across trials.

VentureXpert is our main source for identifying venture capital–backed biopharmaceutical companies. The database reports the universe of VC investments, including round dates, investment types, investor identities, and portfolio company names. VentureXpert is widely used in the literature studying venture financing and ownership, and its longitudinal deal-level coverage allows us to determine whether and when a firm received VC investment.

As a supplementary data source, we use BoardEx, a database that compiles extensive infor-

mation on corporate directors, executives, and their networks. BoardEx enables us to identify VC partners who hold board seats at their portfolio companies, and it also provides demographic attributes for these individuals.

In addition, we draw on Pharmaprojects from Pharma Intelligence, a comprehensive database that tracks drug candidates from early-stage development through launch or discontinuation. Pharmaprojects have been used widely in prior research on drug development and, more recently, on firm innovation behavior (Cunningham, Ederer and Ma, 2021; Hsu et al., 2025). Importantly for our purposes, the database provides detailed, dated histories of development activities and milstone events, along with the originating firms. We use these records to construct measures of VC experience based on the milestones achieved by a VC's portfolio companies.

B Sample Construction

Our starting sample includes all interventional clinical trials with at least one location in the U. S. that were completed on or after January 18, 2017. This criterion follows directly from the implementation timeline of federal reporting requirement under the 2017 Final Rule (42 CFR Part 11), which requires sponsors to include racial and ethnic breakdowns in submitted results for trials of FDA-regulated drugs, biologics, and devices. This regulatory change substantially improved the availability and completeness of demographic data. Fain et al. (2021) document that over 90% of trials covered by the post-requirement period report race and ethnicity information, compared with only 42% of trials in earlier cohorts. Our sample therefore covers the period for which trial racial diversity can be measured consistently and at scale. We impose the location restriction because race/ethnicity categories may differ in studies conducted in other countries. We focus on trials testing interventions classified as "Drug" or "Biological" and exclude other intervention types (e.g., Device, Behavioral, Procedure). This restriction reflects the fact that drug and biological interventions follow a standardized, phase-based clinical trial process and constitute the majority of industry-sponsored trials, as they are directly tied to the development and commercialization of therapeutic products. We further restrict the sample to trials whose lead sponsor is an industry entity rather than academic institutions, hospitals, or government agencies, and require non-missing information on trial phase and participant race. Finally, we limit the sample to trials that began

in years 2014-2021, reflecting the lag between trial initiation, completion, and results reporting in ClinicalTrials.gov.

We next identify firms that were VC–backed prior to the pandemic, which we define as of the end of 2019. Because VC ownership at a specific point in time is difficult to observe directly, we use VC partner presence as well as deal and exit timing to infer VC-backing status prior to the pandemic. We use VentureXpert to compile all firms in the medical, health, and life sciences industries that received at least one VC investment between 2001 and 2019. To determine whether these firms remained VC-backed as of December 2019, we use the BoardEx data to assess whether a partner from the investing VC firm served on its board at the end of 2019. Firms with an active VC-affiliated board member at year-end 2019 are classified as VC-backed. For firms that are not covered by BoardEx, we follow Bernstein, Lerner and Mezzanotti (2019) and check whether there is evidence of exit by VCs prior to the onset of the pandemic.[12]

Finally, we link clinical trials to the VC-backing status of their sponsors. Because key elements that shape trial diversity—such as study design, recruitment strategy, and site selection—are typically determined at the outset of a trial, we consider a trial to be VC-backed if its start date occurs after its sponsor received its VC investment. Accordingly, we exclude any trials that began before the VC investment to ensure that trial conduct is aligned with the firm's financing status at the time decisions affecting participant diversity were made. Overall, our final sample consists of 4750 clinical trials conducted by 1015 companies, of which 197 companies are classified as VC-backed at the end of 2019.

C Key Variables

Racial Diversity Measure. Following the literature on racial diversity in clinical trials (e.g., Rees et al. 2022; Abdel-Rahman et al. 2021; Racadio et al. 2024; Choi et al. 2025), we measure trial diversity using the Simpson's diversity index. For each trial, we observe the number of trial participants in seven categories: White, Asian, Native American, Black, Pacific Islander, multiple races,

[12]Exit events are defined using standard assumptions. M&A transactions remove VC ownership on the deal date. For IPOs, unless there is evidence suggesting otherwise, we assume VCs stay involved for six years post-IPO, reflecting both contractual lock-up periods and evidence that VC-backed firms often continue to rely on their VCs for financing and governance support after going public (Iliev and Lowry, 2020).

and other. Specifically, the Simpson's diversity index for trial j by firm i is defined as:

$$\text{Diversity}_{ij} = 1 - \sum_{g=1}^{7} p_g^2$$

where p_g is the fraction of the participants in group g. Intuitively, this index captures the likelihood that two randomly selected participants belong in different racial groups.

Other Clinical Trial Characteristics. In addition to trial racial diversity, we construct several variables to capture other key characteristics of clinical trials. First, we record each trial's start year. Aggregate conditions—such as the regulatory environment, public demand for racial diversity in clinical research, and the willingness of racial minorities to participate in clinical trials—are likely to vary over time. Trial start year captures this time-series variation. We also record the clinical trial phase. In our sample, trial phase takes one of the following values: early Phase 1, Phase 1, Phase 1/2, Phase 2, Phase 2/3, Phase 3, and Phase 4. Finally, we identify the diseases targeted by each trial. Based on the reported interventions and conditions in CTG, we classify trials into disease categories using the MeSH Tree maintained by the U.S. National Library of Medicine.[13]

Company Characteristics. We construct several company-level characteristics, all measured at the onset of the COVID-19 pandemic (i.e., at the end of 2019). Because most companies in our sample are privately held, detailed financial information is not consistently available. Nevertheless, we hand-collect information on company age and public listing status from multiple sources, including Capital IQ, PitchBook, Crunchbase, LinkedIn, and Compustat.[14]

VC Characteristics. Our analysis examines how variation in VC characteristics relates to firms' ability to improve trial racial diversity in response to the pandemic. We focus primarily on a VC's experience in guiding portfolio companies through the drug-development process. We measure this experience by counting the number of drug-development milestones achieved by a VC's portfolio companies during the decade preceding the COVID-19 pandemic (2010–2019). These milestones include U.S. drug approvals, U.S. drug filings, and advancement to Phases 1, 2, and 3. To ensure that a VC plausibly contributed to the achievement of a given milestone, we require that the VC

[13] Examples of disease categories in the MeSH Tree include cardiovascular diseases, eye diseases, and digestive system diseases. The MeSH Tree can be viewed under Category C (Diseases) at: https://meshb.nlm.nih.gov/treeView.

[14] For a small number of companies for which the founding year is unavailable, we approximate the founding year by subtracting eight years from the year of the company's first clinical trial. This approximation reflects evidence that firms typically initiate their first clinical trial approximately eight years after founding.

be the lead investor and that its initial investment occur at least two years prior to the milestone date.[15] As more conservative alternatives, we construct two additional experience measures: one that counts only advanced-stage milestones (Phase 3 advancement, U.S. drug filings, and approvals) and another that includes only regulatory milestones (U.S. drug filings and approvals).

We construct these milestone-based experience measures separately for lead and non-lead VCs. Lead VCs typically play a more active role in monitoring and advising portfolio companies, and we exploit this variation in our analysis. Following Gompers (1996) and Bernstein, Giroud and Townsend (2016), we define the lead VC as the investor with the longest investment duration.[16] For VC-backed companies with observable board composition in 2019, we further require that the identified lead VC hold a board seat at the end of that year.

Finally, we construct analogous experience measures at the VC-partner level to examine the role of individual human capital in shaping VC ownership effects. For partners serving on the boards of VC-backed companies in our sample, we obtain employment histories from BoardEx and count the number of milestones achieved by companies at which the partner held a leadership role at the relevant time.

D Empirical Strategy

To study whether VC ownership affects how firms adjust clinical trial diversity in response to the COVID-19 pandemic, an ideal experiment would randomly assign VC ownership to pre-pandemic firms. One would then compare changes in trial diversity between VC-backed and non–VC-backed firms around this period. Because such an experiment is not feasible, we approximate it by constructing a suitable control group of non–VC-backed companies and estimating a difference-in-differences regression. In the sections below, we describe how we construct the control group and outline our regression specification.

D.1 Building the Control Group

VCs tend to invest in young firms with strong growth potential. As a result, VC ownership is correlated with several firm characteristics, such as firm age and innovation activity. These char-

[15] For U.S. drug approvals, we require a minimum lag of four years between the VC's initial investment and the approval date, reflecting that FDA approval typically follows filing by approximately two years.

[16] In cases of ties, we follow Bernstein, Giroud and Townsend (2016) and break ties using the amount invested.

acteristics may independently affect how firms adjust clinical trial diversity in response to the pandemic, making it difficult to isolate the effect of VC ownership.

To mitigate this concern, we follow the literature and construct a matched control group of non–VC-backed firms. Prior studies, including Chemmanur, Krishnan and Nandy (2011) and Puri and Zarutskie (2012), form control groups by matching on industry and firm age. Given our focus on trial diversity, we additionally match on firm characteristics that are likely to affect how firms adjust trial diversity in response to the pandemic. Specifically, we match on the following characteristics measured at the end of 2019: industry, firm age, public listing status, the total number of trials conducted prior to the pandemic, and the average racial diversity of a firm's pre-pandemic trials. We implement propensity score matching using a logit model. For each VC-backed firm, we select up to five non–VC-backed firms with the closest propensity scores, allowing matching with replacement. We impose a caliper of 0.05 to ensure close matches and require that each treated firm retain at least two matched control firms after applying this restriction. After applying these criteria, the final matched sample consists of 165 VC-backed firms and 825 non–VC-backed control firms.

Table 1 reports summary statistics for the matched sample at the end of 2019, the year preceding the pandemic. Columns (1)–(2) present statistics for VC-backed firms, while columns (3)–(4) report corresponding statistics for the matched control group. As shown in the table, the two groups are similar across a wide range of observable characteristics, including firm age, the number of pre-pandemic trials, the average diversity index of pre-pandemic trials, an indicator for having conducted a Phase 3 trial prior to the pandemic, and an indicator for having an approved drug prior to the pandemic. At the end of 2019, the average VC-backed firm in our sample is 11.8 years old and has conducted 6.0 clinical trials prior to the onset of the pandemic, with an average trial diversity index of 0.23. At that time, 17% of these firms are publicly traded, 36% have conducted a Phase 3 trial, and 13% have an approved drug. The corresponding characteristics are similar for firms in the matched control group.

D.2 Regression Specification

To assess whether VC backing is associated with greater improvements in trial diversity in response to the pandemic, we estimate the following trial-level difference-in-differences regression:

$$\text{Diversity}_{ij} = \beta \text{VCBacked}_i \times \text{Post}_j + \gamma X_{ij} + \alpha_i + \alpha_t + \alpha_{phase} + \alpha_{disease} + \epsilon_{ij} \quad (1)$$

Here, i indexes companies and j indexes clinical trials. The dependent variable $Diversity$ is the racial diversity of the trial. $VCBacked$ is a dummy equal to one if the company is VC-backed at the end of 2019, and zero otherwise. $Post$ is a dummy equal to one if the trial began in 2020 or later. X_{ij} is a vector of company-level controls. α_i, α_t, α_{phase}, and $\alpha_{disease}$ denote company, trial start year, phase, and disease fixed effects, respectively. Standard errors are clustered at the company level.

The coefficient of interest is β_3. This coefficient compares the change in trial racial entropy before and after COVID-19 for VC-backed companies relative to the control group. A positive estimate indicates that VC-backed companies increase trial racial diversity more than the control group following the onset of the pandemic. Because company fixed effects are included, identification comes from within-firm variation.

The fixed effects absorb potential sources of confounding variation. Trial start year effects account for changes in diversity over time, phase effects capture systematic differences across trial stages, and disease effects control for differences across therapeutic areas. These controls rule out several alternative explanations of our results. For example, if VC-backed firms were more likely after 2020 to conduct Phase 3 trials—which tend to exhibit higher diversity—this would be absorbed by phase fixed effects. Similarly, if VC-backed firms increasingly targeted diseases more prevalent in minority populations, disease fixed effects would capture this variation.

Finally, to further strengthen identification, we include a vector of firm-level controls. Because more than eighty percent of firms in the sample are not publicly traded, detailed financial variables are unavailable. Instead, we measure firm age and whether the firm is publicly traded. To avoid endogeneity concerns in difference-in-differences designs (Angrist and Pischke, 2009; Gormley and Matsa, 2014), we measure these characteristics in the year prior to the pandemic and interact them with the post-period indicator. These interaction terms help mitigate concerns that unobserved company characteristics correlated with VC ownership explain our findings.

4 The VC Effect: Adaptive Response in Trial Diversity

A Do VC-Backed Companies Respond Differently to Covid-19?

Table 2 presents the results from estimating equation 1. All regressions include company fixed effects and trial start year fixed effects. In column (1), the coefficient on the interaction term is 0.093, meaning that trial diversity increase by 0.093 more at VC-backed companies in response to the pandemic relative to the control group. This effect is statistically highly significant. It is also economically significant. Given that the sample average trial diversity is 0.261, a relative increase by 0.093 means that trial diversity increase more by 35.6% of the sample mean at VC-backed companies.

To tighten the source of variation, columns (2)-(4) progressively add fixed effects and controls. Column (2) includes trial phase fixed effects, and column (3) adds disease-group fixed effects. The estimated effect remains similar in size and statistically highly significant after adding these controls. By accounting for systematic differences in trial diversity across trial phases and targeted disease areas, these specifications reduce the scope for alternative explanations based on trial composition. Finally, in column (4), we add firm-level controls to our regression. Doing so changes little our results, both in terms of economic magnitudes and statistical significance. Appendix Table C1 shows that we obtain qualitatively consistent results when we measure trial diversity using the percentage of non-white trial participants.

B Effect Dynamics

The key identifying assumption underlying equation 1 is the standard parallel-trends assumption. In this setting, the assumption says that, absent VC involvement, trial diversity at VC-backed companies and companies in the control group would have changed similarly following the onset of the COVID-19 pandemic.

An important feature of our empirical design that supports this assumption is that the pandemic was an unexpected shock. Prior to 2020, it would have been difficult for VCs to anticipate that trial racial diversity would become a salient concern and to selectively invest in firms positioned to improve trial diversity beginning in 2020. The first major public notice regarding the coronavirus occurred in late December 2019, when Chinese health authorities informed the World Health Or-

ganization (WHO) of a cluster of pneumonia-like cases of unknown cause in Wuhan, China. That the pandemic disproportionately affected racial and ethnic minority populations became apparent in early 2020. These developments were largely unanticipated by investors, including VCs.

While this narrative supports our identifying assumption, the parallel-trends assumption warrants careful empirical scrutiny. To assess this directly, Appendix Table C2 reports regression estimates from specifications that interact the VC-backed indicator with year fixed effects. The interaction terms for years prior to 2020 are all small in magnitude and statistically insignificant. Figure 2 provides a visual representation of these estimates over time. The estimated effect becomes larger in 2021 than in 2020, consistent with increasing pressure on companies to improve trial racial diversity. Importantly, we do not find evidence of differential pre-trends prior to the pandemic.

5 Mechanisms of the VC Effect

A Capital Injections

We next examine the potential mechanisms described in Section 2. Recall that the first mechanism focuses on VCs' ability to inject additional capital into their portfolio companies. Under this mechanism, VC-backed companies increase trial diversity more than the control group because VCs provide additional funding following the onset of the COVID-19 pandemic, helping firms cover the higher costs associated with conducting racially diverse clinical trials.

As a first step in evaluating this mechanism, we examine post-pandemic VC investment activity among VC-backed companies. If capital injections drive the observed increase in trial racial diversity, a substantial share of VC-backed companies should receive VC funding following the onset of the pandemic. Rows 1–3 of Panel A of Table 3 report the extent to which VC-backed companies in our sample received VC funding during the post period (2020–2021). During this period, 12% of VC-backed firms raised capital from VCs, receiving an average of $8.0 million from approximately 0.5 investors over the two-year window. To provide context, rows 4–6 of Panel A report analogous statistics for the two years preceding the pandemic (2018–2019). In that period, 35% of VC-backed firms completed a financing round, raising an average of $27.2 million from 1.9 investors.

Overall, VC-backed firms received substantially less capital following the onset of the pandemic than in the preceding two years. The relatively small fraction of firms receiving new funding during

the post-pandemic period suggests that capital injections may have limited scope to explain the observed increase in trial racial diversity.

According to the mechanism, the improvement in trial diversity at VC-backed companies should be driven by the companies that received funding during the post-period. To study this condition, we estimate a modified version of equation (1). We restrict the sample to trials conducted by VC-backed firms and replace the interaction between $VCBacked$ and $Post$ with an interaction between $Post$ and an indicator for whether the firm received VC funding after the onset of the pandemic. The coefficient on this interaction captures whether improvements in trial racial diversity are larger among VC-backed firms that obtained post-pandemic funding relative to those that did not.

Column (1) of Panel B of Table 3 reports the regression results. As can be seen, the interaction term is statistically insignificant. We obtain similar results when we interact $Post$ with alternative measures of VCs' investments during the post period (columns (2)-(3)). Appendix Table C3 shows that the results are also robust to interacting $Post$ with measures of VCs' investment during the pre-period. Taken together, these results indicate that the increase in trial racial diversity among VC-backed firms is not associated with receiving funding from VCs.

B Managerial Expertise

B.1 Experience of VC Firms

We next turn to the second mechanism, which focuses on VCs' ability to provide managerial guidance to their portfolio companies. According to this mechanism, VC-backed companies improve trial racial diversity more than the control group because the guidance from VCs helps firms navigate the operational and strategic complexities involved in conducting racially diverse clinical trials.

To study this hypothesis, we begin by measuring VCs' ability to provide this guidance. Specifically, we count the number of drug development milestones achieved by VCs while serving as the lead investor at their portfolio companies during the decade prior to the pandemic. These milestones include U.S. drug approvals, U.S. drug filings, and advancement to Phases 1, 2, and 3. As more conservative measures, we construct two additional drug development experience variables: one that counts only advanced-stage milestones (Phase 3 advancement, U.S. drug filings, and ap-

provals) and another that includes only regulatory milestones (U.S. drug filings and approvals). Panel A of Table 4 presents summary statistics for these measures.

According to the second mechanism, our main results should be driven by companies backed by VC firms with drug-development experience, which are better positioned to provide valuable managerial guidance. To test this mechanism, we restrict the sample to trials conducted by VC-backed companies and interact *Post* with measures of VC firms' drug-development experience. A positive coefficient on the interaction term indicates that improvements in trial racial diversity following the onset of the pandemic are driven by companies backed by more experienced VC firms.

Panel B of Table 4 presents the results. Column (1) uses the total number of milestones, column (2) uses the number of advanced-stage milestones, and column (3) uses the number of regulatory milestones. Across all specifications, the interaction terms are positive and statistically significant. The estimated effects—both economically and statistically—are stronger in columns (2) and (3), where we employ more conservative measures of VC firms' drug-development experience.

B.2 Lead VCs vs. Non-lead VCs

To provide further evidence on the underlying mechanism, we exploit the distinction between lead and non-lead VCs. In practice, VC investments are often syndicated, with one VC taking the role of lead investor. In syndicated investments, the lead VC typically assumes primary responsibility for overseeing and supporting the portfolio company, whereas other syndicate members tend to play more limited, capital-providing roles (Gorman and Sahlman, 1989; Bernstein, Giroud and Townsend, 2016). For instance, Gorman and Sahlman (1989) find that lead VCs spend roughly ten times more hours with portfolio companies than non-lead investors. Building on this distinction, Bernstein, Giroud and Townsend (2016) use variation in lead versus non-lead status to isolate the effects of VC monitoring. We adopt a similar approach. If the results in Table 4 reflect the effects of VCs' managerial guidance, then the experience of lead VCs—but not that of non-lead VCs—should explain the improvements in trial diversity at VC-backed companies.

To test this hypothesis, Table 5 re-estimates the regressions using milestone counts for non-lead VCs. When a company has multiple non-lead VCs, we use the maximum milestone count among them. Across all specifications, the interaction terms are smaller than those reported in Table 4

and are statistically insignificant. Taken together, these results support the managerial-guidance mechanism: drug-development experience matters for improving trial racial diversity, but only for lead VCs who play an active role in advising their portfolio companies.

B.3 Reputation of VC Firms

One potential concern with the results in Table 2 is that they may reflect sorting between VCs and startups rather than a causal effect of VC involvement. In particular, in the regressions reported in Table 4, VCs' drug-development experience could proxy for startup quality since more reputable VCs systematically match with higher-quality startups (Sørensen, 2007). Under this interpretation, higher-quality startups may improve trial racial diversity more than lower-quality startups in response to the pandemic, independent of VC involvement.

Our analysis limits the scope for this explanation in two ways. First, it is difficult to reconcile this sorting-based interpretation with the heterogeneity documented in the previous section: only the drug-development experience of lead VCs matters, whereas the experience of non-lead VCs does not. If VC experience were merely capturing startup quality, one would expect similar effects for both lead and non-lead VCs.

Second, we directly distinguish between general VC reputation and VCs' drug-development expertise. If our results were driven entirely by sorting between reputable VCs and high-quality startups, then the findings in Table 4 should persist when we replace measures of drug-development experience with standard indicators of VC reputation.

Appendix Table C4 reports the results of these tests. Columns (1)–(2) proxy for VC reputation using VC firm age, columns (3)–(4) use the number of funds raised, and columns (5)–(6) use total fundraising volume. Across specifications, the interaction terms are generally small, statistically insignificant in five of the six columns, and negative in three of the six columns. Taken together, these results indicate that improvements in trial racial diversity at VC-backed firms are associated with VCs' drug-development experience rather than with broad measures of VC reputation.

B.4 Experience of VC Partners

Managerial guidance provided by VCs may operate through two distinct channels. The first is the organizational capital of VC firms. VC firms' networks, resources, and prior drug-development experience can help portfolio companies improve trial racial diversity in several ways. For example, by leveraging industry connections, VC firms can introduce startups to clinical research sites and hospitals serving diverse communities.

A second channel operates through the human capital of individual VC partners. Many strategies that increase participation among racial minorities—such as reducing participation costs through travel vouchers, simplifying consent materials, or hiring racially concordant recruiters—require careful implementation in the context of clinical trials. Illustrating the importance of implementation, Appendix B describes a pilot program launched by the National Cancer Institute in 2023. This program sought to increase participation among low-income and minority patients by covering travel costs upfront. The program was ultimately described as a "costly failure" (Wilkerson, 2024): it did not increase enrollment diversity and was discontinued after one year, during which travel expenses rose by 45%. Overall, this example suggests that managerial skill——particularly the human capital of VC partners——may play an important role in explaining improvements in trial racial diversity following the onset of the COVID-19 pandemic.

To study the role of VC partners' human capital, we first measure their drug-development experience. For VC partners in our sample, we obtain employment histories from BoardEx and count the number of drug-development milestones achieved while the partner held a leadership role at a company during the decade preceding the pandemic.[17] As with the VC-firm level measures, we also construct more conservative measures that count only advanced-stage milestones and regulatory milestones. Panel A of Table 6 reports summary statistics for these measures of VC partners' drug-development experience.

We next test whether our main results are driven by companies backed by VC partners with greater drug-development experience. If VC partners' human capital plays an important role in improving trial racial diversity, the effect should be stronger for companies associated with more experienced partners. To test this prediction, we restrict the sample to trials conducted by VC-backed

[17]Leadership roles include positions such as chief executive officer, board member, and vice president. We exclude experience in divisions unrelated to drug development, such as sales or marketing.

companies and interact *Post* with measures of VC partners' drug-development experience. Panel B of Table 6 presents the regression results. Column (1) uses the number of milestones, column (2) uses the number of advanced-stage milestones, and column (3) uses the number of regulatory milestones. Across all specifications, the interaction terms are positive and highly statistically significant. Also, the effects are both economically and statistically stronger when we use the more conservative measures of VC partners' drug-development experience.

C VC Partners' Race

Finally, we examine the third mechanism, which builds on homophily theory. As noted by McPherson, Smith-Lovin and Cook (2001), individuals are more likely to emphasize, support, and collaborate with others who share similar demographic backgrounds or lived experiences. Following the death of George Floyd in 2020, many minority business leaders publicly advocated for greater diversity and inclusion.

Under this mechanism, minority VC partners may place greater emphasis on recruiting racial minority participants into clinical trials. If so, our main results could reflect a homophily effect, whereby trial racial diversity increases more at companies advised by VC partners who share demographic characteristics with underrepresented groups.

To study this mechanism, we first identify VC partners' race using publicly available photos and names. Panel A of Table 7 summarizes the racial composition of VC partners in our sample. Of the 118 VC partners, 14 are Asian (11.9%) and 1 is Black (0.8%). In total, 12.7% of VC partners are identified as racial minorities (Asian or Black). These figures are consistent with prior academic studies and industry reports documenting that the racial composition of VC partners is heavily skewed toward White and Asian individuals (e.g., Deloitte 2024; Calder-Wang et al. 2025).

To test whether our main results are driven by minority VC partners, we restrict the sample to trials conducted by VC-backed companies and interact *Post* with indicators for the presence of minority VC partners on the board of directors. Column (1) interacts *Post* with an indicator equal to one if at least one lead VC partner is a racial minority. Columns (2) and (3) interact *Post* with indicators for having at least one Black partner and at least one Asian partner, respectively. The interaction terms are statistically insignificant in columns (1) and (3) and negative and statistically

significant in column (2). Overall, we find no evidence that improvements in trial racial diversity at VC-backed companies are driven by the presence of minority VC partners.

6 Operational Channel: Trial Site Selection

Taken together, our findings are most consistent with the second mechanism, which emphasizes VCs' managerial guidance. As discussed above, an important source of this guidance is likely VCs' organizational capital. Through prior drug-development experience, VC firms develop industry connections and resources that can help portfolio companies improve trial racial diversity.

This section examines a specific operational channel through which such organizational capital may operate: clinical trial site selection. As noted in National Academies of Sciences et al. (2022), pharmaceutical companies generally choose trial sites based on academic prominence and speed of enrollment, which has limited the participation for undeserved patient populations. We argue VC firms may leverage their networks to help companies identify and engage research sites located in areas with a higher share of racial minority populations. By facilitating access to sites that serve more diverse communities, VCs' organizational networks may enable companies to improve trial racial diversity through changes in trial site location.

A Importance of Trial Location for Trial Diversity

The key premise underlying this operational channel is that the demographic composition of the population surrounding a trial site is an important determinant of the racial diversity of enrolled participants. While a small literature supports this view, existing evidence is largely based on small samples (e.g., Lee et al. 2024; Jiang et al. 2025; Ivory et al. 2025). As a first step in examining this channel, we therefore test whether this relationship holds in our baseline sample, which includes more than three thousand clinical trials.

Table 8 reports the results of these tests, regressing trial racial diversity on the share of a trial's sites located in areas with high minority recruitment potential. For U.S. trial sites, a site is classified as having high minority recruitment potential if the ZIP code in which it is located has an above-median share of non-White residents. For non-U.S. trial sites, a site is classified as having high minority recruitment potential if it is located in Asia, Africa, or South American countries with a

high share of Black residents. Across specifications, we find that the share variable has economically and statistically significant effects on trial diversity. In our most stringent specification (column (3)), shifting all trial sites from areas with low minority recruitment potential to areas with high minority recruitment potential increases trial diversity by 0.159, corresponding to approximately 60.9% of the sample mean.

B Stickiness of Trial Site Selection

An important assumption underlying this operational channel is that trial site selection is not frictionless. For several reasons, pharmaceutical companies may find it difficult to relocate clinical trials to new sites—particularly to sites serving high-minority populations—on their own. Information about the research capabilities of many community healthcare sites that serve diverse communities is often limited, making it costly for sponsors to identify suitable new locations (National Academies of Sciences et al., 2022). In addition, expanding a clinical trial to a new site typically requires navigating a new set of regulatory requirements, ethics approvals, and administrative processes (Lai et al., 2020).

If relocating trial sites were easy, VCs' ability to introduce portfolio companies to new research sites or hospitals serving diverse communities would have limited impact. Instead, for VCs' organizational networks to matter, trial site selection must exhibit persistence, with firms tending to rely on familiar locations and facing frictions when switching to new sites. We therefore examine the extent to which companies repeatedly use the same trial locations, providing evidence on the stickiness of trial site selection.

Table 9 examines the stickiness of companies' trial site selection using two complementary approaches. Panel A reports descriptive measures of persistence in trial-site choices. We construct two indicators capturing whether a company has previously conducted a trial at a given location. The variable $UsedZip$ equals one if the pharmaceutical company has previously conducted a trial in the same ZIP code, while $ReuseCity$ is defined analogously at the city level. As shown, companies frequently reuse prior trial locations: 51% of trials occur in previously used ZIP codes, and 67% occur in previously used cities. These patterns indicate substantial persistence in trial-site selection.

We next assess trial-site stickiness using a regression-based approach at the trial–ZIP-code level.

If companies tend to reuse trial sites, prior use of a location should be a strong predictor of whether the company selects that location again. To test this prediction, we randomly select 1,000 trials from our baseline sample and pair each trial with all U.S. ZIP codes that were ever used as trial sites during the sample period. We then estimate regressions in which the dependent variable equals one if the pharmaceutical company selects a given ZIP code as a trial site. The key independent variable, $UsedZip$, equals one if the company previously conducted a trial in that ZIP code.

Panel B of Table 9 reports the regression results. All specifications include trial fixed effects and trial start-year fixed effects, and standard errors are clustered at the trial level. Columns (1)–(2) show that including $UsedZip$ substantially increases the regression's explanatory power, raising the R^2 from 0.6% to 2.1%. According to column (2), prior use of a ZIP code increases the likelihood that it is selected again by 3.3 percentage points, an economically meaningful effect. Column (3) shows that the effect remains robust after controlling for ZIP-code characteristics that may influence site attractiveness, including the share of residents aged 65 or older, the natural logarithm of median income, and the natural logarithm of total population. Finally, column (4) includes ZIP-code fixed effects, absorbing all time-invariant ZIP-level attributes. Even under this most stringent specification, the coefficient on $UsedZip$ remains positive and highly statistically significant.

C Role of VC Ownership

As a final step in examining this operational channel, we test whether VC-backed companies move trial locations toward areas with higher minority recruitment potential more than companies in the control group. To do so, we re-estimate equation 1, replacing the dependent variable with the share of a trial's sites located in areas with high minority recruitment potential.

Table 10 presents the regression results. Across specifications, the interaction term is positive and statistically significant. In our most conservative specification (column (4)), VC backing increases the share of trial sites located in areas with high minority recruitment potential by 7.7 percentage points. This effect is economically meaningful, corresponding to 16.9% of the sample mean.

7 Conclusion

Do VCs influence their portfolio companies' innovation activities, and if so, through which mechanisms? This paper contributes to the literature on venture capital and innovation by identifying a novel mechanism through which VCs affect innovation: by helping portfolio companies adapt their research and development practices in response to changes in regulators' and consumers' expectations.

We provide evidence from the pharmaceutical industry, an economically important sector that has spent approximately $850 billion on drug development over the past decade (Pharmaceutical Research and Manufacturers of America, 2025). Following the onset of the COVID-19 pandemic, pharmaceutical companies faced heightened pressure from both regulators and the public to improve the racial diversity of clinical trial participants. Using a sample of VC-backed companies and a carefully constructed control group, we study how VC-backed companies adjusted their trial diversity in response to this shock.

We find that VC-backed companies increase trial racial diversity more than comparable non–VC-backed companies after the onset of the pandemic. Importantly, these improvements are driven by the drug-development experience of lead VCs, who play an active role in monitoring and advising portfolio companies. We also identify a specific operational channel underlying these effects: VC-backed companies are more likely to reallocate clinical trials toward locations with a higher share of racial minority residents.

Several caveats are worth noting when interpreting our findings. First, many VCs in our sample specialize in healthcare and possess substantial experience supporting pharmaceutical companies in conducting clinical trials. In industries where VCs have less relevant domain expertise, the effects of VC backing may be weaker. Second, the pandemic coincided with both increased public pressure for more diverse clinical trials and new regulatory guidance linking diversity considerations to FDA approvals. Our empirical design does not allow us to separately identify the effects of these two forces. In many settings, however, public pressure and regulation are likely to reinforce one another.

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Main Tables and Figures

Figure 1: Interest in Trial Racial Diversity Over Time

This figure displays Google Trends data for the phrase "diversity in clinical trials." Public interest in the topic peaked in early 2020, coinciding with the onset of the COVID-19 pandemic.

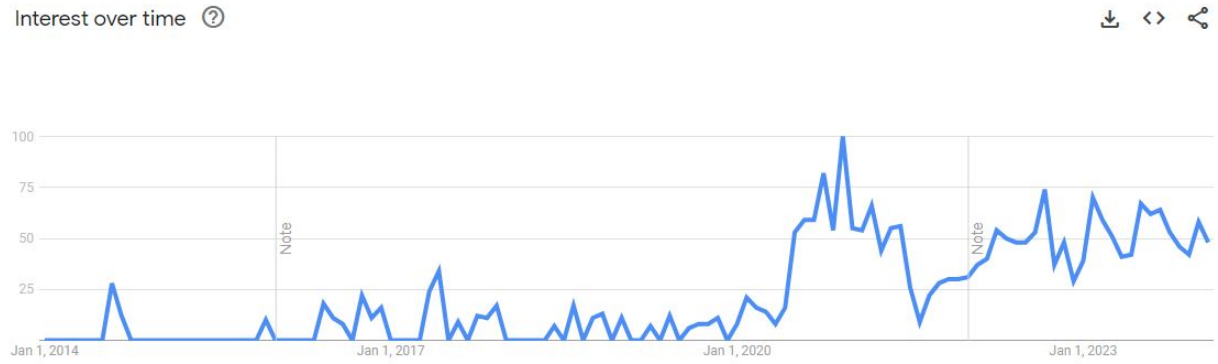

Figure 2: Effect Dynamics

This figure plots the estimated coefficients and their 95% confidence intervals from the regression described in Equation 1, where the variable *Post* is replaced by a set of year dummies. Year 2019 serves as the reference period, and its coefficient is therefore normalized to zero. Standard errors are clustered at the company level. The corresponding regression estimates are reported in Appendix Table C2.

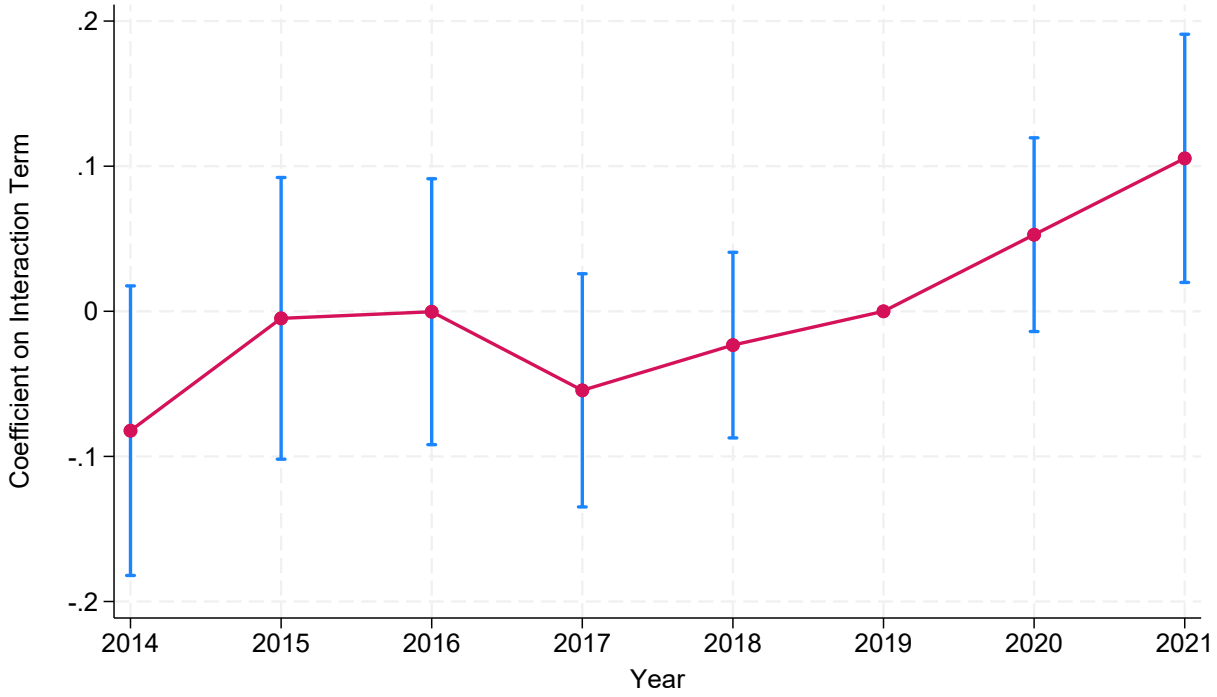

Table 1: Company-Level Summary Statistics

This table reports company-level summary statistics as of the end of 2019 for VC-backed firms and matched non-VC-backed control firms. The last two columns report the absolute difference in means scaled by the standard deviation of each variable and the p-value from a test of equality of means between the two groups. *Company Age (Years)* measures the age of the firm. $\#Trials$ is the total number of clinical trials conducted by the firm. *Public* is a dummy equal to one if the firm is publicly listed. *Diversity* is the average trial-level diversity index across all trials conducted by the firm. $HasPhase3$ and $HasApprovedDrug$ are dummies equal to one if the firm has conducted at least one Phase III trial or has at least one approved drug, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	VC-backed		Control			
	Mean	Median	Mean	Median	|Diff|/SD	p-value
CompanyAge (Years)	11.81	11.00	12.12	11.00	0.05	0.57
#Trials	5.98	3.00	7.90	3.00	0.06	0.41
Public	0.17	0.00	0.14	0.00	0.10	0.25
Diversity	0.23	0.22	0.23	0.22	0.00	0.95
HasPhase3	0.36	0.00	0.32	0.00	0.09	0.30
HasApprovedDrug	0.13	0.00	0.14	0.00	0.02	0.77
Companies	165		825			

Table 2: Main Results

This table presents the results of trial-level regressions estimated using OLS. The dependent variable *Diversity* is the diversity index of the trial. The independent variable *VCBacked* is a company-level dummy that equals one if the company is VC-backed prior to the onset of the pandemic (i.e., at the end of 2019), and zero otherwise. *Post* is a dummy that equals one if the start year of the trial is after 2019. All regressions include company fixed effects and trial start year fixed effects. Columns 2-4 progressively add fixed effects and controls. Columns 2 and 3 include phase number fixed effects and disease group fixed effects, respectively. Column 4 adds firm-level controls. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
	Dep. Var.: Diversity			
VCBacked × Post	0.093***	0.098***	0.102***	0.098***
	(0.031)	(0.030)	(0.029)	(0.031)
FE: Company	X	X	X	X
FE: Trial Start Year	X	X	X	X
FE: Phase Number		X	X	X
FE: Disease			X	X
Firm Controls				X
Mean	0.261	0.261	0.261	0.261
N	3028	3028	3028	3028
R^2	0.456	0.463	0.501	0.502

Table 3: Capital Injections

Panel A reports company-level summary statistics on financing rounds in the two years before and after the onset of the COVID-19 pandemic. Rows 1–3 present statistics for the post-pandemic period (2020–2021). *Round Dummy* equals one if a VC-backed company had at least one financing round during the two-year window. *Round Amount* is the total amount raised (in millions of dollars), and *#Investors* is the total number of investors participating in those rounds. Rows 4–6 present the corresponding statistics for the two pre-pandemic years. Panel B reports trial-level OLS regression results based on trials conducted by VC-backed companies. The dependent variable *Diversity* is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% levels is indicated using *, **, and ***, respectively.

Panel A: Summary Statistics on Financing Rounds

	(1)	(2)	(3)	(4)	(5)	(6)
	Mean	p25	Median	p75	SD	N
Post-Pandemic (2020-21)						
Round Dummy	0.12	0.00	0.00	0.00	0.33	165
Round Amount	7.99	0.00	0.00	0.00	29.27	165
#Investors	0.46	0.00	0.00	0.00	1.54	165
Pre-Pandemic (2018-19)						
Round Dummy	0.35	0.00	0.00	1.00	0.48	165
Round Amount	26.25	0.00	0.00	25.07	63.31	165
#Investors	1.86	0.00	0.00	2.00	3.18	165

Panel B: Regression Results

	(1)	(2)	(3)
	Dep. Var.: Diversity		
RoundDummy×Post	-0.046		
	(0.048)		
ln(1+RoundAmount)×Post		-0.020	
		(0.019)	
ln(1+#Investors) × Post			-0.062
			(0.043)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number	X	X	X
FE: Disease	X	X	X
Firm Controls	X	X	X
Mean	0.252	0.252	0.252
N	460	460	460
R^2	0.608	0.609	0.609

Table 4: VC Firms' Drug Development Experience

Panel A reports VC firm–level summary statistics on VC firms' drug development experience prior to the onset of the COVID-19 pandemic (as of the end of 2019). *#Milestones* is the total number of drug-development milestones achieved by a VC firm while serving as a lead VC at its portfolio companies during the decade prior to the onset of the COVID-19 pandemic (2010–2019). *#Advanced Stages* and *#Regulatory Milestones* are more conservative measures that count only advanced-stage milestones and regulatory milestones, respectively. These variables are described in more detail in Section 3. Panel B reports trial-level OLS regression results based on trials conducted by VC-backed companies. The dependent variable *Diversity* is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. Standard errors are clustered at the company level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Panel A: Summary Statistics on VC Firms' Drug Development Experience

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean	SD	P10	P25	Median	P75	P90	N
#Milestones	9.4	14	0	0	3	14	27	123
#Advanced Stages	3.1	6	0	0	1	3	8	123
#Regulatory Milestones	1.7	4	0	0	0	2	4	123

Panel B: Regression Results

	(1)	(2)	(3)
	Dep. Var.: Diversity		
ln(1+#Milestones)×Post	0.047*		
	(0.028)		
ln(1+#Advanced Stages)×Post		0.060***	
		(0.022)	
ln(1+#Regulatory Milestones)×Post			0.067***
			(0.021)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number	X	X	X
FE: Disease	X	X	X
Firm Controls	X	X	X
Mean	0.252	0.252	0.252
N	460	460	460
R^2	0.615	0.621	0.623

Table 5: Non-lead VCs

This table reports trial-level OLS regression results based on trials conducted by VC-backed companies. The dependent variable *Diversity* is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. We interact *Post* with the drug development experience of non-lead VCs. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

	(1)	(2)	(3)
	Dep. Var.: Diversity		
ln(1+#Milestones)×Post	0.024		
	(0.022)		
ln(1+#Advanced Stages)×Post		0.029	
		(0.023)	
ln(1+#Regulatory Milestones)×Post			0.032
			(0.023)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number	X	X	X
FE: Disease	X	X	X
Firm Controls	X	X	X
Mean	0.252	0.252	0.252
N	403	403	403
R^2	0.595	0.596	0.596

Table 6: VC Partners' Drug Development Experience

Panel A reports VC partner–level summary statistics on VC partners' drug development experience prior to the onset of the COVID-19 pandemic (as of the end of 2019). *#Milestones* is the total number of drug-development milestones achieved by a VC partner while serving in a leadership position at a company during the decade prior to the onset of the COVID-19 pandemic (2010–2019). *#Advanced Stages* and *#Regulatory Milestones* are more conservative measures that count only advanced-stage milestones and regulatory milestones, respectively. These variables are described in more detail in Section 3. Panel B reports trial-level OLS regression results based on trials conducted by VC-backed companies for which individual VC partners can be identified. The dependent variable, *Diversity*, is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. Standard errors are clustered at the company level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Panel A: Summary Statistics on VC Partners' Drug Development Experience

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean	SD	P10	P25	Median	P75	P90	N
#Milestones	11.0	18	0	2	6	12	24	118
#Advanced Stages	3.5	7	0	0	1	3	9	118
#Regulatory Milestones	2.1	4	0	0	0	2	5	118

Panel B: Regression Results

	(1)	(2)	(3)
	Dep. Var.: Diversity		
ln(1+#Milestones) × Post	0.068***		
	(0.020)		
ln(1+#Advanced Stages) × Post		0.082***	
		(0.025)	
ln(1+#Regulatory Milestones) × Post			0.080***
			(0.021)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number	X	X	X
FE: Disease	X	X	X
Firm Controls	X	X	X
Mean	0.256	0.256	0.256
N	328	328	328
R^2	0.579	0.581	0.579

Table 7: VC Partners' Race

Panel A presents summary statistics on the racial composition of VC partners. *Minority* is a dummy equal to one if the VC partner is Asian or Black, and zero otherwise. *Asian* is a dummy equal to one if the VC partner is Asian and zero otherwise; *Black* is defined analogously. Panel B reports trial-level OLS regression results based on trials conducted by VC-backed companies for which individual VC partners can be identified. The dependent variable *Diversity* is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. Standard errors are clustered at the company level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Panel A: Summary Statistics on VC Partners

	(1)	(2)
	Mean	N
Minority	0.127	118
Asian	0.119	118
Black	0.008	118

Panel B: Regression Results

	(1)	(2)	(3)
	Dep. Var.: Diversity		
Minority × Post	0.0860		
	(0.0959)		
Black × Post		-0.104*	
		(0.0588)	
Asian × Post			0.130
			(0.103)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number	X	X	X
FE: Disease	X	X	X
Firm Controls	X	X	X
Mean	0.256	0.256	0.256
N	328	328	328
R^2	0.568	0.567	0.570

Table 8: Demographic Composition of Trial Sites and Trial Racial Diversity

This table presents results from trial-level OLS regressions. The dependent variable *Diversity* is the racial diversity index for each trial. *% High-Minority Areas* is the fraction of a trial's sites located in areas with a high minority recruitment potential. Standard errors are clustered at the company level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)
	Dep. Var.: Diversity		
% High-Minority Areas	0.162***	0.168***	0.159***
	(0.035)	(0.034)	(0.030)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number		X	X
FE: Disease			X
Mean	0.261	0.261	0.261
N	3028	3028	3028
R^2	0.479	0.488	0.522

Table 9: Stickiness of Trial Location

Panel A reports summary statistics at the trial–location (trial × site) level, capturing pharmaceutical companies' tendency to conduct clinical trials at previously used locations. The sample consists of all trial–location observations from trials initiated between 2014 and 2021 and conducted by pharmaceutical companies, where each trial is observed at each of its clinical trial sites. *UsedZip* is an indicator equal to one if a trial–location observation is located in a ZIP code previously used by the pharmaceutical company, and *UsedCity* is defined analogously at the city level. The first trial conducted by each pharmaceutical company is omitted because, by construction, all trial locations are new in a firm's initial trial. Panel B reports results from trial–site–level OLS regressions. We randomly select 1,000 trials with at least one U.S. site and interact these trials with all U.S. ZIP codes that host at least one trial during the sample period. The dependent variable *Select* is an indicator equal to one if the pharmaceutical company conducts a trial in a given ZIP code. *Population*%65+, $ln(1 + medianincome)$, and $ln(1 + population)$ are ZIP-code–level characteristics measured in the year of the trial, capturing the fraction of the population aged 65 and over, median income, and total population, respectively. Standard errors are clustered at the trial level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary Statistics on Trial Location

	(1)	(2)
	Mean	N
UsedZip	0.51	77,528
UsedCity	0.67	77,528

Panel B: Determinants of Trial Location

	(1)	(2)	(3)	(4)
	Dep. Var.: Select			
UsedZip		0.033***	0.033***	0.030***
		(0.002)	(0.002)	(0.002)
Population%65+			-0.005***	0.030**
			(0.001)	(0.013)
Ln(1+median income)			-0.001***	-0.001**
			(0.000)	(0.001)
Ln(1+population)			0.000***	0.001*
			(0.000)	(0.000)
FE: Trial	X	X	X	X
FE: Trial Start Year	X	X	X	X
FE: Zip				X
Mean	0.003	0.003	0.003	0.003
N	5941657	5941657	5941657	5941657
R^2	0.006	0.021	0.022	0.027

Table 10: VCs and Trial Location

This table presents the results of trial-level regressions estimated using OLS. The dependent variable *% High-Minority Areas* is the share of a trial's sites located in areas with a high minority recruitment potential. The independent variable *VCBacked* is a company-level dummy that equals one if the company is VC-backed at the end of 2019, and zero otherwise. *Post* is a dummy that equals one if the start year of the trial is after 2019. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
	Dep. Var.: % High-Minority Areas			
VCBacked × Post	0.091**	0.083**	0.076**	0.077**
	(0.039)	(0.038)	(0.035)	(0.037)
FE: Company	X	X	X	X
FE: Trial Start Year	X	X	X	X
FE: Phase Number		X	X	X
FE: Disease			X	X
Firm Controls				X
Mean	0.455	0.455	0.455	0.455
N	3028	3028	3028	3028
R^2	0.539	0.545	0.561	0.562

Appendix

The Appendix is organized into three parts. Section A defines the variables used in the analysis. Section B provides additional institutional details relevant to the study. Finally, Section C presents supplementary empirical results and robustness checks that are not included in the main text.

A Variable Definitions

This section defines the variables used in the analysis.

A Company Level Variables

The following variables are measured at the company level prior to the onset of the COVID-19 pandemic (i.e., as of the end of 2019). These variables are defined for both VC-backed and non–VC-backed pharmaceutical companies:

- Company Age: the age of the pharmaceutical company, measured in years.
- # Trials: the total number of clinical trials conducted by the pharmaceutical company.
- Public: a dummy equal to one if the pharmaceutical company is publicly traded, and zero otherwise.
- HasPhase3: a dummy equal to one if the pharmaceutical company has ever conducted a Phase 3 clinical trial, and zero otherwise.
- HasApprovedDrug: a dummy equal to one if the pharmaceutical company has at least one approved drug, and zero otherwise.
- VCBacked: a dummy equal to one if the pharmaceutical company is venture-capital backed, and zero otherwise.

The following variables are defined at the company level for VC-backed pharmaceutical companies and are based on the investment activity of the VC over a given period:

- Round Dummy: a dummy equal to one if the pharmaceutical company completed at least one financing round during the given period, and zero otherwise.

- Round Amount: the total amount of capital raised by the pharmaceutical company across financing rounds during the given period, measured in millions of U.S. dollars.

- # Investors: the total number of investors that invested in the pharmaceutical company during the given period.

B VC-Firm Level and VC-Partner Level Variables

The following variables measure the drug-development experience of VC firms and VC partners. Tables 4 and 5 define these variables at the company level using, respectively, the drug-development experience of the company's lead VC firm and non-lead VC firm. When a company has multiple lead (or non-lead) VC firms, we assign the maximum experience value across them. Table 6 defines analogous variables at the company level using the drug-development experience of the company's lead VC partner. When multiple lead VC partners are present, we again take the maximum value. We define the experience measures as follows:

- # Milestones (VC firm): The total number of drug-development milestones achieved by the VC firm at its lead-invested portfolio companies during the decade prior to the COVID-19 pandemic (2010–2019). Milestones include U.S. drug approvals, U.S. drug filings, and advancement to Phases 1, 2, and 3. To ensure that the VC plausibly contributed to the achievement of a given milestone, we require that the VC's initial investment occurred at least two years prior to the milestone date. For U.S. drug approvals, we require a minimum lag of four years between the VC's initial investment and the approval date, reflecting that FDA approval typically follows filing by approximately two years.

- # Advanced Stages (VC firm): The total number of advanced-stage drug-development milestones achieved by the VC firm at its lead-invested portfolio companies during the decade prior to the COVID-19 pandemic (2010–2019). This measure includes Phase 3 advancement, U.S. drug filings, and U.S. drug approvals. We apply the same timing requirements as above: a minimum of two years between the VC's initial investment and the milestone date, and a minimum of four years for U.S. drug approvals.

- # Regulatory Milestones (VC firm): The total number of regulatory drug-development milestones achieved by the VC firm at its lead-invested portfolio companies during the decade prior to the COVID-19 pandemic (2010–2019). This measure includes U.S. drug filings and

U.S. drug approvals. As above, we require that the VC's initial investment occurred at least two years prior to the milestone date and at least four years prior in the case of U.S. drug approvals.

- # Milestones (VC partner): The total number of drug-development milestones achieved by the companies at which the VC partner held a leadership role during the decade prior to the COVID-19 pandemic (2010–2019). Milestones include U.S. drug approvals, U.S. drug filings, and advancement to Phases 1, 2, and 3. To ensure that the VC partner plausibly contributed to the achievement of a given milestone, we require that the partner joined the company at least two years prior to the milestone date. For U.S. drug approvals, we require a minimum of four years between the date the VC partner joined the company and the approval date.

- # Advanced Stages (VC partner): The total number of advanced-stage drug-development milestones achieved by the companies at which the VC partner held a leadership role during the decade prior to the COVID-19 pandemic (2010–2019). This measure includes Phase 3 advancement, U.S. drug filings, and U.S. drug approvals. We apply the same timing requirements as above: a minimum of two years between the partner joining the company and the milestone date, and four years for U.S. drug approvals.

- # Regulatory Milestones (VC partner): The total number of regulatory drug-development milestones achieved by the companies at which the VC partner held a leadership role during the decade prior to the COVID-19 pandemic (2010–2019). This measure includes U.S. drug filings and U.S. drug approvals. As above, we require that the VC partner joined the company at least two years prior to the milestone date and at least four years prior in the case of U.S. drug approvals.

The following variables capture the race of VC partners. Table 7 defines these variables at the company level using the race of the company's lead VC partner. When a company has multiple lead VC partners, we set each indicator equal to one if at least one lead VC partner belongs to the corresponding racial group.

- Minority: An indicator equal to one if at least one lead VC partner is Black or Asian, and zero otherwise.

- Asian: An indicator equal to one if at least one lead VC partner is Asian, and zero otherwise.

- Black: An indicator equal to one if at least one lead VC partner is Black, and zero otherwise.

C Trial Level and Trial-Location Level Variables

The following variables are defined at the clinical trial level and are used in the analysis:

- Diversity: the Simpson diversity index of the clinical trial. For each trial, we observe the number of trial participants in seven categories: White, Asian, Native American, Black, Pacific Islander, multiple races, and other. The Simpson's diversity index of a given trial is defined as:

$$\text{Diversity} = 1 - \sum_{g=1}^{7} p_g^2$$

  where p_g is the fraction of the participants in group g. Intuitively, this index captures the likelihood that two randomly selected participants belong in different racial groups.

- Post: a dummy equal to one if the clinical trial starts after 2019, and zero otherwise.

- % High-Minority Areas: the share of a trial's sites located in areas with high minority recruitment potential. For U.S. trial sites, a site is classified as having high minority recruitment potential if the ZIP code in which it is located has an above-median share of non-White residents. For non-U.S. trial sites, a site is classified as having high minority recruitment potential if it is located in Asia, Africa, or South American countries with a high share of Black residents.

- Phase Number: the phase number of the clinical trial. In our sample, this variable takes one of the following values: early Phase 1, Phase 1, Phase 1/2, Phase 2, Phase 2/3, Phase 3, and Phase 4.

- Trial Start Year: the starting year of the clinical trial.

- Targeted Disease: the diseases targeted by the trial. Based on the reported interventions and conditions in CTG, we classify trials into diseases categories using the MeSH Tree maintained by the U.S. National Library of Medicine.

The following variables are defined at the trial-location level:

- UsedZip: a dummy equal to one if the clinical trial site is located in a ZIP code previously used by the pharmaceutical company in prior trials, and zero otherwise.

- UsedCity: a dummy equal to one if the clinical trial site is located in a city previously used by the pharmaceutical company in prior trials, and zero otherwise.

- Population % 65+: the fraction of the population aged 65 and over in the ZIP code of the trial location, measured in the trial start year.
- Median Income: median household income in the ZIP code of the trial location, measured in the trial start year.
- Total Population: total population in the ZIP code of the trial location, measured in the trial start year.

B Institutional Background

A Timeline of COVID-Era Events Related to Clinical Trial Diversity

Appendix Table B1 summarizes key public, industry, and regulatory events that contributed to increased attention to racial and ethnic diversity in U.S. clinical trials during and after the COVID-19 pandemic. Together, these events indicate that pressure on pharmaceutical companies to improve trial diversity intensified following the onset of the pandemic.

B Case Studies in Trial Diversity Initiatives

To illustrate the critical role of managerial expertise in diversifying clinical trials, we contrast two recent initiatives. While both shared identical objectives, their divergent outcomes highlight the difference between purely financial solutions and expertise-driven operational strategies.

The first is a pilot program launched by the National Cancer Institute (NCI) in 2023, which sought to increase participation among low-income and minority patients by paying their upfront travel costs. The program, however, was described as a "costly failure" (Wilkerson, 2024). According to the NCI, it did not increase enrollment diversity and was discontinued after one year, during which travel expenses increased by 45%. This initiative demonstrates that providing capital or removing financial hurdles is often ineffective if not paired with the domain expertise required to address deep-seated cultural and mistrust barriers.

The second example is a trial conducted in Los Angeles between 2020 and 2023 by researchers at Cedars-Sinai Medical Center (Ross et al., 2024). The researchers employed a multi-tiered, culturally sensitive outreach strategy to improve recruitment of non-Hispanic Black and Hispanic participants. They began with formative focus groups to identify barriers such as mistrust, language and cultural disconnects, and unclear consent materials. They then revised all study documents

into plain, culturally adapted language, emphasized voluntariness and safety, and incorporated inclusive imagery. Recruitment was personalized through physician-endorsed outreach (e.g., emails signed by the patient's own doctor) and by using electronic health records to microtarget minority patients. The team also partnered with community clinics and support groups, distributed adapted materials in public settings, and simplified eligibility verification procedures. After implementing these strategies, minority enrollment rates roughly doubled—especially among Hispanic participants—demonstrating the effectiveness of recruitment approaches grounded in community trust, cultural relevance, and personal connection. This success underscores the efficacy of recruitment strategies grounded in community trust and specialized operational execution, the type of "value-add" that experienced, active VCs may provide to their portfolio firms.

C Social Momentum and Minority Leadership Post-2020

Broader social movements influenced corporate behavior during the COVID-19 pandemic. The death of George Floyd in 2020 galvanized U.S. corporations to strengthen their commitments to diversity and inclusion, with Fortune 1000 companies pledging approximately $340 billion toward racial equity initiatives by late 2022 (Armstrong, Edwards and Pinder, 2023). In its aftermath, driven by both personal conviction and stakeholder expectations, many minority CEOs and business leaders emerged as prominent advocates for advancing diversity and inclusion within corporate America.

For example, Ken Frazier, then CEO of Merck, spoke openly about racial injustice, stating that "[George] Floyd could be me or any other African American man," underscoring the personal connection many Black Americans felt to the tragedy (Bulik, 2020). Frazier also took concrete action by co-founding the OneTen coalition in late 2020, alongside former American Express CEO Ken Chenault and others, with the goal of hiring or promoting one million Black Americans into family-sustaining jobs over ten years (Safdar, 2020).

Similarly, a 2021 Business Insider article, "DEI Trailblazers: 16 Diversity Executives Transforming the Workplace in Post–George Floyd Corporate America," highlighted 16 executives leading diversity and inclusion initiatives across major U.S. corporations, 13 of whom were racial or ethnic minorities (Ward, 2021). Among them, Maxine Williams, Chief Diversity Officer (CDO) of Facebook (Meta), and Sonia Cargan, CDO of American Express—both women of color—used the post-Floyd momentum to establish higher diversity targets and expand corporate investment in minority communities.

These examples illustrate the "catalyst" role minority leaders can play, providing the qualitative basis for our exploratory hypothesis that minority VC partners might similarly influence portfolio company behavior in clinical trials (Hypothesis 2C).

Table B1: Timeline of Key Events

This table lists key public, industry, and regulatory events that contributed to heightened attention to racial and ethnic diversity in U.S. clinical trials during and after the COVID-19 pandemic. The timeline illustrates the progression from early media scrutiny and voluntary firm actions to formal regulatory guidance and statutory requirements, forming the basis for the empirical design.

Date	Event Type	Event Description
Dec 2019	Public	Initial outbreak of COVID-19 reported, marking the beginning of the pandemic.
Apr 2020	Public	Chicago public health authorities reported that Black residents, representing approximately 30% of the city's population, account for roughly 70% of COVID-19 deaths; the report received national attention (Hernández and Klemko, 2020).
May 2020	Public	Reports documented disproportionate COVID-19 infection and fatality rates among racial and ethnic minority communities in Michigan, Los Angeles, and New York (LeBlanc, 2020; Cosgrove and Vives, 2020; Abrams, 2020).
Mid-2020	Public	Major media outlets highlighted increasing pressure on pharmaceutical companies to ensure COVID-19 vaccine trials reflect U.S. racial and ethnic diversity, carrying headlines such as "The pressure is on for COVID-19 vaccine trials to reflect U.S. diversity" and "A trial for coronavirus vaccine researchers: Making sure Black and Hispanic communities are included in studies" (Aleccia, 2020; Mara, 2020).
Sep 2020	Industry	Moderna deliberately slowed enrollment in its Phase III COVID-19 vaccine trial to increase participation from racial and ethnic minority groups (Steenhuysen, 2020).
Nov 2020	Industry	Pharmaceutical Research and Manufacturers of America (PhRMA), the U.S. trade group for pharmaceutical companies, released its first industry-wide principles on the conduct of clinical trials, explicitly committing to improving participant diversity (PhRMA, 2020).
Nov 2020	Regulatory	FDA issued guidance titled *"Enhancing the Diversity of Clinical Trial Populations—Eligibility Criteria, Enrollment Practices, and Trial Designs,"* recommending strategies to increase racial and ethnic representation in trials. Although non-binding, it signaled the beginning of a policy shift toward making diversity planning a more formal part of drug development.
Aug 2021	Regulatory	Members of Congress introduced the Diversifying Investigations Via Equitable Research Studies For Everyone (DIVERSE) Trials Act in August 2021. While the bill did not advance beyond the committee stage, it reflected growing legislative interest in expanding access to clinical trials for underrepresented populations. Its provisions included requiring HHS and FDA guidance on decentralized clinical trials to reach diverse participants, permitting free digital health tools for trial subjects, and authorizing HHS grants to support community outreach and recruitment.
Jul 2022	Public	A consortium of academic centers and community organizations, including Yale School of Medicine and Vanderbilt University Medical Center, launched Equitable Breakthroughs in Medicine Development (EQBMED), a community- based initiative designed to pilot sustainable clinical trial sites in underserved areas.
Jul 2022	Industry	Novartis launched the Beacon of Hope initiative, partnering with historically Black colleges, universities, and medical schools to create new clinical trial centers.
Dec 2022	Regulatory	Congress passed the Food and Drug Omnibus Reform Act (FDORA). Under this law, sponsors of most Phase III and pivotal drug and device trials must submit a Diversity Action Plan to the FDA. The plan must set enrollment targets by age, sex, race, and ethnicity and explain how those targets will be achieved. FDORA marked the transition from non-binding recommendations to a statutory requirement (U.S. Food and Drug Administration, 2022). Underscoring the importance of this shift, FDA Commissioner Robert M. Califf, M.D., remarked that "going forward, achieving greater diversity will be a key focus throughout the FDA to facilitate the development of better treatments and better ways to fight diseases that often disproportionately impact diverse communities".
Mid 2023	Industry	Additional pharmaceutical companies, including Amgen, Alnylam, Sanofi, and Merck, join the Novartis-led Beacon of Hope coalition to expand support for minority-serving clinical trial centers.
2025	Regulatory	A report by Acclinate noted that the FDA has increasingly required pharmaceutical companies to conduct post-marketing studies when their initial clinical trials lack sufficient participant diversity (Acclinate, 2025).

C Additional Results

Table C1: Alternative Measure of Racial Diversity

This table presents the results of trial-level regressions estimated using OLS. The dependent variable *% Non-White* is the percentage of non-white trial participants. The independent variable *VCBacked* is a company-level dummy that equals one if the company is VC-backed prior to the onset of the pandemic (i.e., at the end of 2019), and zero otherwise. *Post* is a dummy that equals one if the start year of the trial is after 2019. All regressions include company fixed effects and trial start year fixed effects. Columns 2-4 progressively add fixed effects and controls. Columns 2 and 3 include phase number fixed effects and disease group fixed effects, respectively. Column 4 adds firm-level controls. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
	Dep. Var.: % Non-White			
VCBacked × Post	8.791**	9.456***	9.300***	9.128***
	(3.486)	(3.527)	(3.207)	(3.311)
FE: Company	X	X	X	X
FE: Trial Start Year	X	X	X	X
FE: Phase Number		X	X	X
FE: Disease			X	X
Firm Controls				X
Mean	19.787	19.787	19.787	19.787
N	3028	3028	3028	3028
R^2	0.456	0.462	0.491	0.492

Table C2: Effect Dynamics

This table presents the results of trial-level regressions estimated using OLS. The dependent variable, *Diversity*, is the diversity index of the trial. The independent variable *VCBacked* is a company-level dummy that equals one if the company is VC-backed at the end of 2019, and zero otherwise. *Post* is a dummy that equals one if the start year of the trial is after 2019. *Y2014* is a dummy equal to one if the trial began in 2014; other year dummies are defined analogously. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

	(1)	(2)
	Dep. Var.: Diversity	
VCBacked × Y2014	-0.080	-0.082
	(0.051)	(0.051)
VCBacked × Y2015	-0.003	-0.005
	(0.049)	(0.049)
VCBacked × Y2016	0.001	-0.000
	(0.047)	(0.047)
VCBacked × Y2017	-0.054	-0.054
	(0.041)	(0.041)
VCBacked × Y2018	-0.022	-0.023
	(0.033)	(0.033)
VCBacked × Post	0.076**	
	(0.032)	
VCBacked × Y2020		0.053
		(0.034)
VCBacked × Y2021		0.105**
		(0.043)
FE: Company	X	X
FE: Trial Start Year	X	X
FE: Phase Number	X	X
FE: Disease	X	X
Firm Controls	X	X
Mean	0.261	0.261
N	3028	3028
R^2	0.505	0.505

Table C3: Capital Injections Prior to the Pandemic and Trial Diversity

This table reports trial-level OLS regression results based on trials conducted by VC-backed companies. The dependent variable *Diversity* is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. *RoundDummy*, *ln(1+RoundAmount)*, and *ln(1+#Investors)* capture VC investment activity during 2018–2019. *Round Dummy* equals one if a VC-backed company had at least one financing round during the two-year window. *Round Amount* is the total amount raised (in millions of dollars), and *#Investors* is the total number of investors participating in those rounds. Standard errors are clustered at the company level. Significance at the 10%, 5%, and 1% levels is indicated using *, **, and ***, respectively.

	(1)	(2)	(3)
	Dep. Var.: Diversity		
RoundDummy×Post	-0.020		
	(0.069)		
ln(1+RoundAmount)×Post		-0.021	
		(0.013)	
ln(1+#Investors)×Post			-0.045
			(0.032)
FE: Company	X	X	X
FE: Trial Start Year	X	X	X
FE: Phase Number	X	X	X
FE: Disease	X	X	X
Firm Controls	X	X	X
Mean	0.252	0.252	0.252
N	460	460	460
R^2	0.607	0.611	0.610

Table C4: Standard Measures of VC Reputation

This table reports trial-level OLS regression results based on trials conducted by VC-backed companies. The dependent variable *Diversity* is the racial diversity index for each trial. *Post* is a dummy equal to one if the trial's start year is after 2019. We interact *Post* with several measures of VC firm characteristics measured prior to the onset of the COVID-19 pandemic (as of 2019). $VCFirmAge$ is the age of the VC firm, and $Ln(VCFirmAge)$ is the natural log of this variable. $\#Funds$ is the number of funds raised by the VC firm during the decade prior to the pandemic (2010–2019), and $ln(1+\#Funds)$ is the natural log of one plus this variable. $FundRaisingAmount$ measures the total capital raised by the VC firm during the decade prior to the pandemic, in thousands of dollars, and $ln(1+FundRaisingAmount)$ is the natural log of one plus this variable. Standard errors are clustered at the company level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	VC Firm Age		# of Funds		Fundraising Amount	
	Dep. Var.: Diversity					
VCFirmAge×Post	0.003					
	(0.003)					
Ln(VCFirmAge) × Post		0.028				
		(0.083)				
#Funds × Post			-0.004			
			(0.006)			
ln(1+#Funds) × Post				-0.021		
				(0.040)		
FundraisingAmount × Post					0.000*	
					(0.000)	
ln(1+FundRaisingAmount) × Post						-0.004
						(0.012)
FE: Company	X	X	X	X	X	X
FE: Trial Start Year	X	X	X	X	X	X
FE: Phase Number	X	X	X	X	X	X
FE: Disease	X	X	X	X	X	X
Firm Controls	X	X	X	X	X	X
Mean	0.472	0.472	0.472	0.472	0.472	0.472
N	460	460	460	460	460	460
R^2	0.618	0.617	0.618	0.618	0.620	0.617